

A Formulary of Drugs for the Tropics.

T. F. G. M.



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FORMULARY OF CERTAIN DRUGS USED
IN THE SURGICAL TREATMENT
OF TROPICAL DISEASE.

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FORMULARY OF CERTAIN DRUGS USED IN THE SURGICAL TREATMENT OF TROPICAL DISEASE.

COMPILED BY

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INTRODUCTION.

1.4.19.

THIS *Formulary* contains a purely arbitrary selection of drugs and their preparations, excerpted from a large number of papers. The choice has been given to those useful in the surgical treatment of disease as met with in the Tropics. An attempt has been made to render the individual formulæ readily accessible.

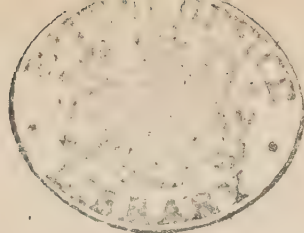
In one or two instances an outline has been given of special technique required.

The references are incomplete. Much information has been obtained from the "*Tropical Diseases Bulletin*"; the "*Lancet*" and "*The British Medical Journal*" have been freely consulted, while Squire's "*Handbook to the British Pharmacopœia*" has been used to complete the information under each head.

T. F. G. M.

Freetown,

7th February, 1917.



FORMULARY OF CERTAIN DRUGS USED IN THE SURGICAL TREATMENT OF TROPICAL DISEASE.

1.4.19.

ACETYL-P-AMINOPHENYL STIBIATE OF SODIUM.

Has been given in the treatment of Infantile Leishmaniasis.

This salt contains 38·5 per cent. of Antimony. It is easily soluble in water, but the solution changes with time and must be freshly prepared.

Method of administration.—Intramuscular injection. (It should never be given subcutaneously.) Intravenously in ill-nourished children.

Dose.—Under two years, 3 to 10 centigrammes, beginning with the smaller dose. Over two years, 5 to 15 centigrammes. One injection is given on alternate days.

ACID CARBOLIC C_6H_6O .

A hygroscopic crystalline substance, which readily absorbs water from the air; it is likewise altered by light: consequently, in the tropics, it should be kept in dark amber coloured spring stoppered bottles.

It combines with and precipitates albumen, but the precipitate is still strongly antiseptic.

The following formulæ are useful:—

R

Carbolic acid	...	...	1 part
Spirit	...	...	5 parts

(This formula was originally used by Lister.)

R

Carbolic acid	...	...	1 part
Water	...	...	19 parts

Washing out a wound with this solution will not sterilize it if it contain the spores of pyogenic bacilli. Liquefied carbolic acid will kill them in a very few minutes.

R

Carbolic acid	...	...	1 part
Olive oil	...	...	10 parts

This formula has about the same strength as an antiseptic as the 1 in 20 watery solution.

R

Carbolic acid	...	...	1 part
Rectified spirit	...	...	12 to 15 parts

This is a very useful antiseptic and hæmostatic. It has also the advantage that, in an emergency, instruments can be placed in the solution and sterilized by firing.

(Oliver Stuart, B.M.J., Nov., 1914.)

R

Tinct. iodi	...	...	1 part	1 drachm
Lot. acid carbolic 1 in 60	...	...	160 parts	1 pint

This is a very useful antiseptic.

(Bland Sutton, B.M.J., Dec. 5, 1914.)

Carbolic acid has been used in *Tetanus*, but its use has now been almost abandoned.

The following formulæ have been used in the disease :—

R

A 4 per cent. or 5 per cent. solution in water

This has been given by intramuscular injection in doses of 2 c.c. repeated every two hours for a few days and subsequently every four hours.

R

A $\frac{1}{2}$ per cent. solution in water

This has been given in doses of 10 c.c. injected intrathecally once every two days after withdrawing an equal quantity of cerebro-spinal fluid.

Acid Carbolic and Iodine.

Tinct. iodi	...	...	1 drachm
Lot. ac. carbol. 1 in 60	...	...	1 pint

(Bland Sutton, B.M.J., Dec. 5, 1914.)

PHENOL CAMPHOR.

Carbolic acid	...	...	30 parts
Camphor	...	...	50 parts
Alcohol	...	...	8 parts

This solution has been used with good results by Scheile for injection into suppurating joints and tendon sheathes.

Dose.—5 grammes may be injected every other day into the knee joint.

REFERENCE.—Scheile. *Zentralblatt für Chirurgie*, Oct. 24, Vol. 41, No. 43, pp. 1,609 to 1,632.

ANOTHER FORMULA. Take equal parts, by weight, of carbolic acid and camphor. Rub together in a mortar.

This formula has been used in the treatment of war wounds. It is necessary to provide free drainage, but the dressings need only be changed once every forty-eight hours.

The following advantages are claimed for this method of treatment :—

It overcomes sepsis more rapidly than the other methods ; with its use amputations are far less frequent ; it diminishes pain ; it only requires changing at long intervals ; its use is associated with no danger.

Bonnain's Anaesthetic Liquid.

Menthol	} Equal parts
Cocaine	...	...	...
Carbolic acid crystals	...	...	...

This has been used in Dermal Leishmaniasis prior to the application of tartar emetic in powder to the ulcers.

CHULMSKY'S SOLUTION.

Melt on a water bath crystalline phenol	30 parts
Add gum camphor	60 parts
Followed by alcohol, 95 per cent. ...	10 parts
Filter	

This solution is of an oily consistence and consequently does not stick to wounds.

A very useful formula in gas and other severe infections.

ACID PICRIC. $C_6H_2(NO_2)_3OH$.

A germicidal analgesic.

It is of especial value in the treatment of burns of the second and third degree. The following formula is to be recommended :—

Picric acid	...	...	$1\frac{1}{2}$ drachms	1 part
Alcohol	...	...	3 ounces	16 parts
Sterile water	...	...	2 pints	214 parts

Picric acid may be applied as a dressing in the following formula :—

Picric acid	...	...	0.2 per cent. to 0.5 per cent.
Spirit rect.	...	...	10.0 per cent.
Water	...	...	90.0 per cent.

This may be used for baths, dressings or for the syringeing out of cavities.

Brown (T.F.) *Lancet*, September 2, 1916, p. 433.

ACID HYPOCHLOROUS—DAKIN'S FLUID, EUSOL, EUPAD, LORRAIN'S SOLUTION.

This acid is formed by the action of boric acid on bleaching powder thus :—



If this reaction takes place in a large quantity of water a solution is formed, if in a small quantity of water gas is driven off.

The ultimate decomposition product of hypochlorous acid in the tissues is hydrochloric acid or sodium chloride. The solution is unstable. The most stable solution is one containing 0.5 per cent. of the acid; more concentrated solutions soon come to this level after which they decompose more slowly. A solution of this strength may safely be applied to wounds.

Hypochlorous acid accelerates the dissolution of necrosed tissue; it is a hæmostatic and a hæmolytic and must therefore never be used for intravenous injection.

It must not be used in the presence of alcohol nor must it be warmed.

In a wound it should be renewed constantly and should penetrate into all its crevices.

It is non-toxic and non-irritant to the tissues and may be used in large quantities and over long periods.

Under its influence the fetor of gangrenous tissues disappears in twenty-four hours. It is not necessary to change the dressings frequently. The injection of the solution into the rubber tubes may, with safety, be left to very imperfectly trained orderlies. The preparation of the solution is simple. It is cheap. It should be kept in coloured bottles. The solution injures towels and instruments; they should be thoroughly washed, free from any trace of the solution immediately after use. The solution will not keep for more than a week in the tropics. The solution is warmed before use by placing it in hot water or a solution of double strength (50 grammes to the litre) may be prepared, to which hot water is added just before use. This strong solution will not keep for more than two days.

DAKIN'S FLUID.

Dissolve dry sodium bicarbonate	...	140 grammes
or crystalline sodium bicarbonate	...	400 grammes
in water	... ..	10 litres
Add chloride of lime of good quality	...	200 grammes
Mix		
Stand for half an hour		
Siphon off the clear fluid		
Add acid boric	... ..	40 grammes
Filter through cotton wool		

It is important to add the boric acid before and not after filtration.

A slight precipitate of lime salts may make its appearance, but it is of no consequence.

The above solution will not keep for more than a week; it should therefore not be used for a longer period, but be freshly prepared.

Method of use and precautions.—The solution so prepared may be used for irrigation or continuous instillation for more than a week.

It must not be used for intravenous injection ; it must not be used in the presence of alcohol, nor must it be warmed.

In a wound it should be renewed constantly and should penetrate into all its crevices.

DAKIN'S FLUID—strong solution.

Carbonate of lime	...	...	...	150 grammes
Carbonate of soda	...	...	...	150 grammes
Water ...	...	...	...	1 litre
Mix				
Filter				

(It is now necessary to calculate the amount of boric acid required).

Take 20 c.c. of the filtrate.

Add to it a solution of boric acid (31 grammes to 1 litre) using phenophthaleine suspended in water as an indicator.

NOTE.—In making the solution an excess of boric acid must not be used.

Add the required amount of boric acid.

This concentrated solution contains 4 per cent hypochlorite of soda.

Dufreane's Modification of Dakin's Formula.

R

Chloride of lime	...	...	...	200 grammes
Sodium carbonate (dry)	...	...	...	100 grammes
Sodium bicarbonate	...	...	...	80 grammes

Place the chloride of lime in a flask with five litres of water. Shake violently for a few minutes. Allow to stand for from six to twelve hours. Dissolve the carbonate of soda in another flask with five litres of water. Mix the two solutions. Shake. Allow to stand (calcium chloride falls to the bottom). Siphon off the supernatant fluid. Filter. Keep in the dark.

Method of use.—Intermittent flushing of a wound from an irrigator communicating, by several tubes having holes at frequent intervals, with every part and recess of the wound. Gauze is wound lightly round the tube.

The result is such a rapid decline in the infection of a wound, that sufficient sterilization is effected to allow of the plating of fractures.

This solution cannot be injected intravenously. It would produce a clotting of the blood. But *see* Eusol, page 14.

It must be mixed with six parts of water before use.

EUPAD.

Equal parts of bleaching powder and boric acid.

Methods of use :

- (1) Enclosed between layers of gauze soaked in water.
- (2) As in (1), but covered with mackintosh. It must not be used in this way for more than twenty minutes at a time.
- (3) Powdered on a gauze drain.
- (4) As a dusting powder.

EUSOL. (Lorrain Smith's solution.)

There are two methods of preparing this solution :—

- (a) Eupad 25 grammes
 Water 1 litre
 Allow to stand
 Filter through cloth or filter paper

- (b) Bleaching powder 12·5 grammes
 Water 1 litre
 Mix
 Shake
 Add boric acid 12·5 grammes
 Allow to stand, preferably overnight
 Filter

Eusol contains

Hypochlorous acid	...	...	...	0·54 per cent.
Calcium biborate	...	...	...	1·28 per cent.
Calcium chloride	...	...	...	0·17 per cent.

Methods of use :

- (1) As a lotion with water or saline.
- (2) As a fomentation covered with waterproof.
- (3) Applied on gauze wrung out of the solution without waterproof.
- (4) As a bath, full strength or diluted.
- (5) Intravenous injection with 8·5 grammes NaCl per litre. Dose 55–200 c.c. This has been given in Kala Azar and in acute toxæmia following gas gangrene.

Trade.—Messrs. Duncan Flockhart and Co., of 104 to 108, South Cannongate, Edinburgh, make a case containing boric acid and chlorinated lime, so that the solution of hypochlorous acid may be freshly prepared.

Lorrain Smith's original formula should be rigidly adhered to ; the substitution of sodium bicarbonate for boric acid has the following disadvantages :—

The solution rapidly deteriorates. It cannot be injected intravenously because it produces clotting of the blood.

REFERENCES.—Bowlby, B. M. J., December 25th, 1915, p. 1,397.

FORMULA FOR INTRAVENOUS INJECTION.

In toxæmias by gas organisms.

R

Sodium chloride	...	...	...	8·5 grammes
Eusol	...	...	...	1 litre

Dose.—40 to 70 c.c.

ACID SALICYLIC.

Three formulæ have been used in the treatment of wounds :

(1) Salicylic acid solution :

Saturated solution of salicylic acid in alcohol 2 to 3 drachms to 1 pint.

Normal saline solution.

The wound is irrigated with this solution at the end of an irrigation with normal saline. Crystals of salicylic acid are thus sown over the wound and they come into solution gradually.

(2) **Salicylic Acid Paste:**

Acid salicylic	...	...	...	I gramme
Saline solution	...	...	...	9 c.c.

This is used as an application to the cut surfaces of bones in septic amputations.

(3) Salicylic Acid Gelatin, 2 to 4 per cent.

Take 300 grammes of Gelatin
Add 600 c.c. normal saline solution
Melt in a steamer
Clear with egg albumen
Divide into bottles of 100 c.c. capacity
Sterilize carefully (against tetanus) by heating to
100 c. on three successive days
When required for use, melt the gelatin, cool to
40 c., add 2 to 4 grammes acid salicylic

This solution may be irrigated into the wound. The irrigation should be repeated daily.

ACID TANNIC.

This has been given with good results in Amoebic dysentery.

Dose.—1 to 2 c.c. of a 2 per cent. solution, *i.e.*, 0·04 grammes.

Method of use.—Intramuscular injection.

ADRENALIN. $C_9H_{13}NO_3$.

When dry, adrenalin is stable but on exposure to damp, light and air, inert substances are formed. In the tropics it should be kept in well stoppered bottles in a cool dark place.

The following formulæ are useful :—

R
I in 10,000 solution.

This is injected subcutaneously in 10 minim doses in cases of snake bite poisoning and it is used in the prophylaxis of shock from chloroform anaesthesia in a 20 minim dose, but it must be given before the anaesthetic. *It is dangerous in the highest degree to inject adrenalin into a patient under chloroform anaesthesia.*

Adrenalin is useful if anaphylaxis follows the prophylactic injections of serum against Cholera, Plague and Typhoid. It is also of benefit in the treatment of Anuria following the injection of salvarsan. It has also been used with benefit in "intestinal washes" at intervals of four days in Amœbic Dysentery.

For Anuria following injections of salvarsan :—

20 minims of a 1 in 10,000 solution may be injected subcutaneously, followed by 20 minims of a 1 in 1,000 solution by the mouth.

AIROL.

See Bismuth Oxyiodogallas.

ALCOCK'S IODINE SOLUTION. *See* Iodine.

ALCOHOL.

Absolute (may contain 1 per cent. of water)	
Spirit rectificatus	90 per cent. alcohol
Alcohol	70 per cent.
Alcohol	60 per cent.
Alcohol	45 per cent.
Alcohol	20 per cent.

Methylated spirit is a mixture containing —

Spirit rect.	(90 per cent.)	90 parts
Wood spirit	...	10 parts

Rectified spirit is not very antiseptic ; it has been used for syringeing out suppurating sinuses and bullet wounds.

Alcohol, 70 per cent., is a powerful antiseptic.

Alcohol, 60 per cent., is the best dressing for badly infected wounds. Wash out the wound with it, apply it as a compress without protective. If the wound is sloughing change the dressing four times a day, if not sloughing once a day.

Methylated spirit is a good antiseptic in the First Aid treatment of wounds.

Alcohol is hygroscopic and evaporates rapidly ; it should be kept in rubber stoppered bottles, which should be lipped so as to facilitate pouring.

ALKALINE FLUID OF ROGERS. See Sodium Carbonate.

AMBETINE.

Contains the three known alkaloids of Ipecacuanha. It is cheaper than emetine and just as good.

Sandwith (F.M.) Lancet, 19th September, 1914.

ANTILEPROL.

A purified form of chaulmoogra oil.

A clear limpid oil with hardly any smell and without disagreeable taste. Causes no digestive ill effects. The most valuable remedy in leprosy, but its use must be prolonged for five years or more.

Dose.—30 to 60 drops daily, after meals, in hot milk or in capsules; 15 to 150 minims daily by the mouth; 3 to 5 c.c. Intramuscular injection.

Methods of use.—By the mouth, and by intramuscular injection.

ANTILUETIN.

A preparation of Antimony.

Dose and method of administration. $\frac{1}{2}$ to 1 grain may be given daily by the mouth without the occurrence of objectionable symptoms.

ARSENOBENZOL. See Salvarsan.

ANTIMONY (Metallic.)

This has been given with good results in the treatment of Kala Azar, Yaws and Trypanosomiasis.

There are two forms in which it may be given :—

(a) In a colloidal form (2 c.c. suspension.)

(b) In a state of fine division.

Dose.—Of (a) 0.001 to 0.003 grammes on successive days.
Of (b) 1 to 3 grains.

Methods of use.—Intramuscular injection suspended in olive oil. Intravenous injection suspended in normal saline. The actual intravenous injection is immediately preceded and followed by the injection of pure saline.

Preparation.—The suspension in normal saline is prepared in the following manner :—

Stir the dose to be given in about half an ounce of normal saline. Gradually add saline while stirring, making up to about six ounces of fluid altogether.

The administration of the drug is not followed by unpleasant after-effects.

See also "Metoleine."

ANTIMONY TARTRATE. $(K(SbO)C_4H_4O_6)_2H_2O$
(Synonym.) **Tartar Emetic.**

Has been used with benefit in Sleeping Sickness, Kala Azar, Infantile Kala Azar and in Dermal and American forest leishmaniasis, Yaws, as well as for the destruction of the gamete of the Malaria parasite.

Dose.—0.02 to 0.1 gramme in children of from fifteen months to two years; 0.05 to 0.1 gramme in 1 in 100 or 1 in 1,000 solution.

Methods of use.—Intravenous injection in normal saline solution for ten consecutive days every month in Infantile Kala Azar and Sleeping Sickness.

Intravenous injection of a 1 per cent. solution in physiological serum sterilized by filtration in the cold through a Berkefeld filter.

Dose.—5 c.c. on each of five successive days or one dose of 5 c.c., and 10 c.c. a week later. In Da Silva's hands this method has given "marvellous results" in American forest leishmaniasis.

Intravenous injection in 4 per cent. physiological salt solution. Dermal leishmaniasis. (Vianna recommended a 1 per cent. salt solution, the increased strength recommended above obviates the usual rise of temperature resulting from his method.)

Intravenous injection of a 1 per cent. or 2 per cent. watery solution either at the bend of the elbow or into the Jugular or Temporal veins.

Dose.—Commence with a minimal dose of 2 c.g. Increase to a maximum dose of 10 c.g.

Toxic symptoms. Salivation, Nausea, Diarrhoea, Headache, and Sore Throat.

Castellani. *Jl. Trop. Med. and Hyg. Parasit.* Vol. 18 p. 113.

REFERENCES.—Di Cristina (G.) and Caronia. *Interna Pathologica* Vol. 7 No. 151, February, 1915. *Bull. Soc. Path. Exot.* Vol. 8, No. 2, February, 1915.

Terra (F.) *Boletin da Soc. Brasiliers da Dermatologie*, 1913, Vol. 2, Nos. 2 and 3, da Silva *Arch. Brasileiros de Med.*, 1914, Apr., Vol. 1, No. 4.

TARTAR EMETIC AND LIQUOR FOWLERI.

In the treatment of Yaws :

R

Tartar emetic	...	...	...	...	30 grains
Liq. fowleri	...	...	...	...	100 minims
Aq. dest.	...	...	...	...	100 c.c.

Dose.—1 to 2 c.c.

Method of use.—Dilute the dose to be used with an equal amount of distilled water. Inject intravenously twice a week for three months, if necessary.

REFERENCE.—Castellani *Jl. of Trop. Med. and Parasit*, Vol. 18, p. 113.

CASTELLANI'S YAWS MIXTURE.

Tartar emetic	...	...	...	...	1 grain
Sod. sal.	...	...	...	...	5 to 10 grains
Pot. iod.	...	...	...	...	1 drachm
Sod. bic.	...	...	...	...	15 grains
Water	...	...	...	...	1 ounce

One ounce of the mixture in four times the amount of water three times a day. Shake the bottle.

Children from eight to fourteen years of age, half doses
Younger children, one-third doses.

ANTIMONY SODIO TARTRATE.**(PLIMMER'S SALT.)**

Has been given daily in Sleeping Sickness in conjunction with the injection of Atoxyl every third day, and alone, in the treatment of Kala Azar.

Dose.—2 grains dissolved in 2 pints of water.

Method of use.—By the mouth or per rectum, daily.

ANTI-RABIC VACCINE.

The treatment must usually be carried out at an anti-rabic institute. Semple has devised a fluid carbolized preparation, which may be sent to the patient.

The treatment is useless when the disease is declared. The vaccine may protect for many months.

In an emergency the following vaccines may be used prophylactically, but their effect is transient lasting only three weeks :—

Anti-diphtheritic serum
Tetanus antitoxin
Anti-plague serum
Antistreptococcal serum.

ANTI-TYPHOID VACCINE. (Wright-Leishmann.)

This is a sterile suspension of killed typhoid bacilli. It is sent out in sealed phials, which should be kept in a cool dark place.

Dose.—First dose 500 million bacilli. Second dose 1,000 million bacilli, ten days after the first dose. Third dose, same as the second dose after another ten days interval.

Method of use.—Subcutaneous or intravenous injection.

Technique of the injection.

Apparatus :

A sterilizer
Spirit lamp
Bowl of antiseptic solution
Syringe 1 c.c. capacity
Two or more needles : Platinum iridium are the best
Dressing forceps

Shake each phial before use. Open the phial under antiseptic precautions. Flame the neck before and after use. Do not use the phial again. Clean the site of inoculation, preferably below the left clavicle, with alcohol and ether or tinct. iodi. Draw the contents of the phial into the syringe. Remove air from the syringe. Take up a fold of skin. Inject deep into the subcutaneous tissues. Withdraw needle, applying cotton wool to the site of puncture as it is drawn out. Warn the patient against alcohol and of the subsequent malaise, fever and soreness of the site of inoculation. Keep the arm at rest and the patient from active exercise. Sterilize the needle after each patient and the syringe from time to time. In the Army give the injection at 4 p.m. Order the patient to bed at 8 p.m. Put him on "Light Duty" for two days.

The protection given lasts a year.

ANTIVENINE.

This is antitoxine prepared from the use of snake venom.

The serum is consequently markedly specific in character, a separate serum being required for every venom.

The Serum of Calmette of Lille is prepared against cobra bite.

Dose.—30 to 40 c.c. as soon as possible after the bite, given hypodermically. 10 c.c. should be given intravenously in addition to the subcutaneous injection if an interval has elapsed.

The polyvalent serum of the Kasauli Research Institute has been prepared against the bite of Russell's viper and the cobra.

ARGYROL.

A very hygroscopic albuminate of silver. Used in the treatment of Gonorrhœa. The following solutions are employed :—

- 5 to 25 per cent. for urethral injection
- 10 per cent. as an instillation
- 20 per cent. for the posterior urethra
- 1 to 4,000 to 1 to 2,000 as an injection
- 1 to 2 per 1,000 as an irrigation in chronic anterior urethritis.

Solutions of this compound are prepared by dropping it into cold water and allowing it to dissolve without trituration.

ARSALYT.

Bis.methyl.amino.tetramino.arseno.benzol. A preparation of salvarsan. Has been used in Tropical Ulcer, and "with encouraging results" in Syphilis and Malaria.

Dose:—

0.1 gramme for every 10 kilos of body-weight
3.6 grammes for a man of 70 kilos
(0.1 gramme in one case produced "untoward results.")

Method of administration.—Intravenous injection by means of a 20 c.c. syringe.

ARSENOPHENYLGLYCIN. Erlich.

A derivative of atoxyl.

Muehlens P. Deut. Med. Wochenschr. April 9, Vol. 40, No. 15.

Mühlens (P) Gethaar (F) Behefte 2 Arch. f. Schiff's u Tropenhyg. T.D.B. Vol. 4, 292.

ARSENOBENZOL.

See Salvarsan.

ATOXYL.

Sodium p.amino.phenylarsenite.

$\text{Na NH}_2\text{C}_6\text{H}_5\text{AsO}_3\cdot 4\text{H}_2\text{O}$
or $\text{NH}_2\text{C}_6\text{H}_4\text{AsO} \begin{Bmatrix} \text{ONa} \\ \text{OH} \end{Bmatrix}$ } Contains from 20 per cent. to

26 per cent. of arsenic. May be obtained in sterile vials ready for use. It has been given with benefit in Sleeping Sickness and Kala Azar. In Sleeping Sickness it is more efficient as regards sterilization than salvarsan.

Dose and Method of administration:—

Manson's method.—2 to 3 grains every third day for at least two years. (Sleeping Sickness.)

Borden and Rodhain's method.— $7\frac{1}{2}$ grains intramuscularly every fifth day.

Dangers: Optic Neuritis has followed the administration of 3 grammes in one month.

The sterilizing dose, in white rats, of Atoxyl and its allies compared:

	<i>T. Rhodesiense.</i>	<i>T. Gambiense.</i>
Atoxyl ...	Above 20 c.g. per kilo	15 to 18 c.g. per kilo
Salvarsan ...	... 1.0 to 1.5 c.g.	0.75 to 1.0 c.g.
Neo-Salvarsan ...	... 1.0 to 1.5 c.g.	1.0 to 1.5 c.g.
Galyl ...	... 0.75 to 1.0 c.g.	0.5 to 0.75 c.g.
Ludyl ...	... 1.5 to 2.0 c.g.	0.75 to 1.0 c.g.

Atoxyl combination methods of treatment:

ATOXYL-EMETIC.

Treatment for Sleeping Sickness.

Method of administration and dosage. Two periods separated by a month's interval. In each period are given three increasing doses of Atoxyl:—

0.5—0.75—1.2 gramme
or 0.5—1.0—1.5 gramme

From the fifth to the fifteenth day, ten daily injections of Emetic (antimony tartrate) are given in doses from 0.09 to 0.15 gramme.

ATOXYL-ORPIMENT.

Method of Administration.—Two series of twenty days' treatment, separated by eight days' rest.

Each series comprises five hypodermic injections of Atoxyl (0.5—0.75 gramme) at four days' intervals and Orpiment 0.3 gramme increased each day, until 1.1 gramme is being given every day. *See also Arsenophenylycin.*

REFERENCES.—Vorwert Arch of Schiffs in Tropen Hyg. 1914, Vol. XVIII, No. 10, Martin (Louis) and Darré (Henri) Bull. Soc. Path. Exot Dec. 1914, Vol. 7, No. 10.

ATROPINE.

This drug has been given in Bacillary Dysentery by Ussener with encouraging results.

Dose.—0·0005 grammes two or three times a day.

Method of use.—Subcutaneous injection.

Morphine is injected with the second dose in order to obviate any danger should there be a personal idiosyncrasy to the drug.

BACELLI'S FORMULA. *See* Quinine.

BECK'S BISMUTH PASTE. *See* Bismuth Paste.

BEESWAX, ASEPTIC.

(Sir Victor Horsley's formula.)

R

Beeswax	...	...	...	...	87 parts
Almond oil	...	...	...	...	12 parts
Salicylic acid	...	...	...	...	1 part

Melt the beeswax and oil. Strain through muslin. Heat to 150° C. (300°F). Add the salicylic acid. Allow to cool slightly. Pour into sterile stoppered bottles. When cold, add to each bottle sufficient mercuric chloride solution 1 in 500 to cover the wax.

This wax is used for arresting hæmorrhage from bone.

BELLET'S FORMULA. *See* Calcium Chloride.

BETA EUCAINE. (Eucaine B. Hydrochloride.)

Has been used in Sciatica.

Dose.—80 to 100 c.c. of a 1 per cent. solution in normal saline.

Method of use.—Inject around the sacro-sciatic nerve at the sacro-sciatic notch.

BILLION. *See* Neo Salvarsan.

BISMUTH.

A very useful drug in Amœbic Dysentery, used in conjunction with emetine.

Dose.—15 to 60 grains every four hours.

3 drachms every four hours (Deeks of Panama.)

BISMUTH PASTE.

There are two formulae.

BECK'S BISMUTH PASTE.

Bismuth Carbonate	...	...	...	30 grammes
White wax	...	...	...	5 grammes
Soft paraffin	...	...	...	5 grammes
Vaseline	...	...	...	60 grammes

One per cent. of Formalin may be added to the paste. Mix while boiling. This paste, while it is boiling and during injection, must be kept from contact with water; so that instruments must be dry.

Soft paraffin differs from hard paraffin in that it is absorbable.

Method of use.—It is used for filling up the cavities of bone, the paste being subsequently invaded and replaced by bone.

The paste is supplied in two consistencies, the hard and the soft.

RUTHERFORD MORRISON'S FORMULA.

Bismuth Carbonate	...	1 ounce by weight
Iodoform	... ..	2 ounces by weight
Soft paraffin	...	enough to make a thick paste

Technique of application :

Give a general anæsthetic. Cover the wound with a compress, 1 in 20 carbolic acid. Clean the skin all round with 1 in 20 carbolic acid. Open the wound freely being especially careful not to injure nerve trunks. Cleanse the cavity of the wound with dry mops. Remove sloughs with a Volkmann's spoon. Remove foreign bodies. Mop the wound and the skin round it with methylated spirit, using cotton wool mops on forceps. Fill the wound with the paste. Dress with sterile gauze. Cover with an absorbent pad. Bandage and sticking plaster.

If the discharge come through the dressings, do not remove them but wet the place with methylated spirit and apply a dry dressing over it.

The best method of applying the paste is by means of two bone teaspoons, one used as a ladle and the other as a spatula.

To redress: (It is not necessary to do this frequently). Remove the dressings. Apply a compress of spirit to the wound. Wipe away the discharge with mops soaked in spirit. Plaster the wound with the paste. Apply gauze, pad and bandage. Do not disturb the paste in the depths of the wound.

Septic wounds treated with the paste, heal by first intention under infrequent dressings and without drainage. Abscesses filled with it, heal up.

Compound fractures may be plated with safety if the paste is used.

REFERENCE.—Rutherford Morrison, *Lancet*, August 12, 1916, pp. 268–272.

BISMUTH OXYIODOGALLAS. (Aiol.)

May be used as an antiseptic dusting powder for ulcers or it may be employed as an ointment with vaseline or anhydrous lanoline.

It has been used in Phagedænic Ulcer of the foot in order to stimulate granulations.

BRILLIANT GREEN.

This has been used with benefit in the treatment of infected wounds but it has not been found so generally useful as Flavine, *q.v.* The drug may not be injected intravenously and after a fortnight's use, may produce some irritation of the skin. Under its influence in the treatment of wounds, exuberant bright red granulations are produced.

Method of use.—A 1 in a 1,000 solution as a dressing or as a formentation.

This drug has been injected into the subarachnoid space by Kopke, (1916) in the treatment of Sleeping Sickness but without effect as regards sterilization.

CAFFEINE.

Is soluble in a solution of sodium salicylate in which solution, it may be injected subcutaneously.

(20 grains can be dissolved in 60 minims of water by the aid of 20 grains of sodium salicylate or 20 grains of sodium benzoate.)

CALCIUM CHLORIDE.

Is given before operation as a prophylactic against hæmorrhage.

Dose.—30 to 60 grains three times a day by the mouth from twenty-four to forty-eight hours before operation. 60 grains three times a day by enema for forty-eight hours after operation.

In severe cases of Blackwater Fever the following formula has been employed by Bellet :—

R

Calcium chloride	...	...	...	4 to 5 grammes
Sodium chloride	...	...	...	10 grammes
Distilled water	...	...	...	1,000 grammes

Dose and method of use.—100 to 200 c.c. injected subcutaneously.

For the sodium chloride either sodium or potassium bicarbonate (5 grammes), may be substituted in the treatment of the acidosis accompanying the following diseases :—

Delayed chloroform poisoning. Yellow fever. Epidemic jaundice (severe cases). Mediterranean yellow fever. Weil's disease. Blackwater fever. Malaria associated with jaundice. Acute yellow atrophy of the liver. Phosphorus poisoning.

CAMPHOR.

The official dose is from 2 to 5 grains, but in cases of Cardiac failure and especially in Pneumonia 30 grains may be given by subcutaneous injection in sterilized olive oil.

CASTELLANI'S POLYVALENT VACCINE.

Against Typhoid, Paratyphoid A and B and Cholera.

This is a very successful prophylactic against all four diseases and the re-action to the vaccine is no greater than after vaccination against any one of them.

CASTELLANI'S YAWS MIXTURE.

See Antimony Tartrate.

CHAULMOOGRA OIL.

Has been given with benefit in Leprosy. *See* also Antileprol.

Dose and method of use.—3 to 5 c.c. by intramuscular injection.

The following mixture may be given :

R

Chaulmoogra oil	...	...	...	60 c.c.
Camphorated oil	...	...	...	60 c.c.
Resorcin	...	...	...	4 grammes

(Oil of Eucalyptol, or oil of sweet almonds or both may be used as vectors.)

Mix. Dissolve with the aid of heat on a water bath. Filter.

Dose and method of use.—An initial dose of 1 c.c. by the mouth which is increased to the point of tolerance.

REFERENCE.—Heiser, V.G., *Amer. Jnl. Trop. Dis. and Parasit.*, Nov. 11, No. 5, pp. 295 to 355.

CHEATLE'S FORMULA.

R

Absolute alcohol	...	...	...	500 parts
Carbolic acid	...	...	...	25 parts
Hydrarg. perchlor.	...	...	...	1 part
Rosaline	...	...	...	q.s.

CHINOSOL (Quinosol.)

A powerful antiseptic freely soluble in water. It is not without toxic qualities. Solutions for the disinfection of instruments should not be too concentrated. In its presence, mercurial cream becomes solid.

CHLORAL HYDRATE.

Dose in Tetanus.—6 grammes every six hours until torpor is produced.

CHLORAMINE.

Sodium Para Toluene Sulphocarbamide $\text{NaCH}_3\text{SO}_2\text{NCl}$, $3\text{H}_2\text{O}$. White prismatic crystals with a faint chlorinous odour. Readily soluble in water yielding a solution with a slightly alkaline re-action. It is a very stable substance even in solution. It is free from corrosive action : does not coagulate proteins and is non toxic. It is a powerful antiseptic and may be employed in the following strengths :

- 1 to 2 per cent. as a mouth wash
- 5 per cent. for the irrigation of the Bladder or Uterus
or as applied on gauze dressings

It should not be mixed with other antiseptics. It is decomposed by alcohol and hydrogen peroxide.

CHLORETONE. $\text{C}_4\text{H}_6\text{Cl}_3(\text{OH})$.

A very useful drug in Tetanus.

Dose in Tetanus.—30 to 80 grains.

Method of use. The above dose is dissolved in hot olive oil and injected per rectum. It is repeated next day if symptoms recur and may be given daily for a week or more if necessary.

The drug relaxes the muscles, prevents spasms and allows the patient to take food and to obtain sleep.

CHOLERA VACCINE.

A killed carbolized preparation of the Cholera Bacilli.

It is prepared by the emulsification of agar cultures of the Cholera Spirillum.

Method of use.—Two vaccines are prepared, the weak and the strong. First inject 1 c.c. of the weak vaccine, give an interval of from seven to ten days. Inject 1 c.c. of the strong solution.

CHOLESTERINE.

Has been given for its anti-hæmolytic action in Blackwater Fever but it is probably of no use.

Dose and method of administration.—1 gramme every four hours in olive oil. Intramuscular injection.

COCAINE.

Has been used with marked benefit in the treatment of snake bite in cases of bites from the following West African snakes : *Echis carinatus*, *Naia nigricollis* and *Bilis arietans* both in conjunction with local treatment by potassium permanganate and alone.

Dose and method of use.—“Full doses” injected into the punctures and into the subcutaneous tissues round them.

It is advisable at the same time to give gelatine by the mouth.

COLLOSOL ARGENTUM.

This is a colloid solution of metallic silver. It is a clear sherry-coloured liquid. Strength 1 in 2,000. It has been used in the treatment of Gonorrhœal conjunctivitis, Interstitial keratitis, Blepharitis, Dacryocystitis, burns and wounds of the conjunctiva. It is a most useful preparation in the treatment of these conditions.

(Legge-Roe, A. B. M. J., January 16, 1914.)

COLLARSOL HYDRARGYRUM.

This is a colloidal solution of metallic mercury containing 1 of the metal in 2,000. It is a powerful bactericide.

DAKIN'S FLUID.

See Acid Hypochlorous.

DEXTROSE.

The following has been given with benefit in Cholera :—

R

Five per cent. solution in normal saline for subcutaneous injection.

R

Ten per cent. solution in normal saline for intravenous injection.

DUFREANE'S MODIFICATION OF DAKIN'S FORMULA.

See Acid Hypochlorous.

DUPUY'S SOLUTIONS.

(a)	Tinct. Iodi	...	...	...	...	100 c.c.
	Alcohol	...	...	...	...	450 c.c.
	Ether	...	...	...	...	450 c.c.
(b)	Camphor	...	...	...	...	100 c.c.
	Alcohol	...	...	...	...	450 c.c.
	Ether	...	...	...	...	450 c.c.

Method of use.—The wound is dry dressed. A drainage tube passes through the dressings to the very bottom of the wound. Every two hours a few c.c. of (a) are injected through the tube into the wound. If the patient is in a serious condition from shock, with a small quick pulse, solution (b) is injected instead of (a). It is not necessary to change the dressings often.

DYSENTERY VACCINE.

This is prepared and used in the same way as is the Anti-typhoid vaccine, in the prophylaxis of Bacillary Dysentery.

ELECTRARGOL.

Has been used in the treatment of Plague and in Epididymitis, Prostatitis and Pappataci fever.

A perfectly clear pseudo-solution containing very minute ultramicroscopic particles of colloidal silver. It is made by the passage of electric sparks, through water, between silver plates. The solution possesses catalytic power.

Dose and method of use.—Up to 60 c.c. intravenously in plague. 15 to 30 minims injected into the Epididymis in acute inflammation. (Harmonic). 30 to 45 minims by intramuscular injection once or twice a day in Prostatitis.

In Epididymitis one injection usually aborts the attack but if the case is advanced the injection may be repeated twice

with an interval of 24 hours between each, (making a total of three injections.)

EMBALMING SOLUTIONS FOR WOUNDS.

See Chulmsky's solution and Mencières' solution.

EMETINE.

A monomethyl ether of cephaline. $C_{29}H_{40}O_4N_2$.

A colourless amorphous powder. Its halogen salts and its chloride are crystalline. The sulphate, nitrate, acetate, etc., have only been obtained in the amorphous form. Of its crystalline salts, the hydrochloride is the only one which is sufficiently soluble to be suitable for hypodermic use; it is therefore always employed.

EMETINE HYDROCHLORIDE.

$C_{30}H_{44}N_2O_4 \cdot 2HCl, 3H_2O$. A white crystalline powder made up of woolly needles easily soluble in water or alcohol. Dissolves at body temperature, about one part in four of water. Aqueous solutions are readily sterilized by heat without decomposition. It is an expensive drug and, if it is going to do good, its good effects are quickly apparent. Long continued courses are useless; moreover, it may of itself produce and keep up diarrhoea. Two short courses are likely to cure a case, *i.e.*, 10 to 15 grains in all.

Dose.— $\frac{1}{2}$ to 4 grains.

Children tolerate the drug well.

At one year and four months $\frac{1}{7}$ grain may be injected daily for two weeks.

At two years: $\frac{1}{6}$ grain and in severe cases of Dysentery, repeat every twelve hours until $\frac{1}{2}$ grain has been given.

Lethal dose.—About 15 grains intracellularly and about 5 grains intravenously.

Nausea is a sign of poisoning. The drug has no accumulative action.

Method of administration :

Intracellular injection.—That is to say, in the intracellular spaces between the subcutaneous tissue and the subjacent fascia lata. Three inches below the clavicle is a good site.

Intravenous injection.—If time is important.

Sandwith's routine in Amœbic Dysentery.—Give $\frac{1}{2}$ grain morning and evening on the first day. Then give $\frac{1}{2}$ grain once a day for a week. Then give $\frac{1}{2}$ grain every second day for a week.

In a gangrenous or critical case give $\frac{1}{2}$ to 1 grain doses every four hours.

Continue emetine once a week or once a fortnight for three months.

In Amœbic Dysentery.—If the stools have not improved in number and character at the end of three days' treatment by emetine, it is practically certain that the case is not one of pure Amœbic Dysentery. Thus emetine may be used for diagnosis as is quinine for Malaria. In giving emetine for Dysentery the total amount administered should be controlled by regular microscopic examination of the stools. The drug is not always effective even in Amœbic Dysentery. The minimal treatment to ensure against a relapse in the administration is 1 grain daily for 5 days. (Nathan Barlow).

Pyorrhœa alveolaris.—Emetine has been given in this disease also with good results.

In Sprue.—It has been given with very good results in combination with treatment by buccal streptococcal vaccine.

Dose.— $\frac{1}{2}$ grain two or three times a week increased to 1 grain.

In Yaws.—Five injections of 0.01 grammes are reported to have cured one case.

REFERENCES.—B. M. J., November 13, 1915, p. 727.

Sandwith, F. M., Lancet, September 19, 1915.

Willets, David G. Preliminary report on the treatment of Entamœbiasis with Ipecac Emetine and Neo-salvarsan at the Phillipine General Hospital, Manilla. Phillipine Jnl. of Science, Sec. B., Trop. Med., February, 1914, Vol. 9, No. 1, pp. 93 to 117. T. D. B., Vol. 4, No. 6.

Rogers, Leonard. Two cases of Sprue treated by streptococcal vaccines and emetine hydrochloride hypodermically. Jnl. Trop. Med. and Hyg., July 1, 1914, p. 199, Lancet, June 6, 1914.

Bayma, Theodoro. A Emetina na Framboesia, Tropica, Rev. Med. de S. Paulo, September 15, 1913, Vol. 16, No. 17, pp. 311 to 314.

Emetine, Toxicology.—Poisoning is apt to cause Peripheral Neuritis, purpuric eruptions and oedema. General muscular pain and weakness especially of the legs, wrist and foot drop are common.

In order to obviate the danger of poisoning, not more than from 5 to 10 centigrammes should be given daily for from five to ten days in succession. An interval of at least five days should follow this course.

The following is a *résumé* of a case of poisoning that resulted from the exhibition of 6 centigrammes of the drug on each of six successive days.

There was a paresis of the muscles of the extremities and spine causing a feeling of laxity of the spine and intense weariness on sitting up. Deglutition was difficult and the palate flaccid.

There was Analgesia of the skin, but the sensibility to tactile, thermic and positional stimuli was unaltered.

The patellar and ankle reflexes were preserved, but tendon reflexes were absent. The plantar reflex was abolished, but the abdominal ones preserved. Babinski's, Gordon's and Oppenheim's signs could be elicited on the left side.

The pupils were normal.

There was tachycardia (144 beats to the minute) and the pulse was weak.

Constipation was noted.

There was a leucocytosis of the cerebro spinal fluid.

A blood count gave the following result :—

Neutrophiles	...	...	...	...	61 per cent.
Large mononuclears	...	...	...	...	18 per cent.
Lymphocytes	...	...	...	...	21 per cent.
Eosinophiles	...	...	...	...	0

The urine contained neither albumen nor sugar.

Electric examination shewed the Erb-Duchesne's phenomena.

The patient took one month to recover, the difficulty of deglutition and the sense of muscular weakness being the last symptoms to disappear.

Symptoms of poisoning disappear on stopping the administration of the drug.

The administration of 6 grains has produced severe neuritis in an adult.

EMETINE BISMUTH IODIDE.

Is insoluble in dilute acids ; it therefore passes unchanged through the stomach. In the intestine it decomposes into emetine and bismuth sulphide.

3 grains of the drug is equivalent to 1 grain of emetine.

This drug is even more efficient as regards the sterilization of the patient from the *Entamoeba Hystolytica*.

Dose and method of use.—Two methods :

1. 3 grains after the evening meal until 36 grains have been given.
2. 1 grain three times a day until 36 grains have been given.

It should be given in cachets or in Keratin-coated tablets.

The use of this drug is often attended by a good deal of discomfort, nausea, vomiting and diarrhoea but the exhibition and dose of the drug should not be influenced on that account.

ETHER.

Has been used as an antiseptic under the following conditions with good results :—

Large abscess cavities, *e.g.* Psoas.

Dose.—1½ ounces.

Compound fractures. Large septic wounds and sinuses. Suppurating and infected joints.

Dose.—Not more than 2 drachms for the knee joint. Aspirate before the injection and put on extension afterwards.

Peritonitis, or in conditions in which the peritoneum has been soiled.

Dose.—3 ounces. $\frac{1}{2}$ ounce in a child of five.

The tube can be left in Douglas' pouch for the injection of ether, it is then clamped for four hours and after that may be used alternately for drainage and the injection of ether. There should be two openings in the tube half an inch and one inch from the distal end otherwise the injections will be difficult.

Osteomyelitis, the medullary cavity may be opened by a gutter incision in the bone and the ether allowed to boil in the cavity.

REFERENCE.—Waterhouse, Hubert F. A report on the employment of Ether in Surgical Therapeutics, B.M.J., Feb. 6, 1915, p. 233.

EUPAD.

See Acid Hypochlorous.

EUSOL.

See Acid Hypochlorous.

FIBROLYSIN.

A compound of thiosinamine and sodium salicylate. Readily soluble in water. It is supplied in ampoules containing 2 to 3 c.c.

Method of use.—Warm the ampoule in water at 113° F. Inject intramuscularly every second and or third day.

The following formula is also useful :

R

Antipyrin	...	...	...	...	7½ parts
Fibrolysin	...	...	...	...	15 parts
Water. ...	...	...	...	...	100 parts

Fibrolysin has been given by Leber in Elephantiasis.

FLAVINE. Diamino. methyl. acridinium chloride.

This substance has been introduced recently for the treatment of wounds. It is said to possess the following advantages ; it has great antiseptic power ; relatively non-toxic

to phagacytosis ; lack of irritative effect on epithelial tissues ; high bactericidal power against *cocci* and *bacillus coli* which is enhanced by the presence of serum. Under its influence in the treatment of wounds, less brilliant granulations are formed than under the influence of brilliant green and they are of a pale pink colour. The surrounding skin is not irritated after prolonged contact with the drug.

The drug is fairly stable, solutions of it may be boiled or heated up to 120°C in an autoclave.

Methods of use.—1 in 1,000 solution as a fomentation.

1 in 1,000 solution injected into the tissues as a prophylactic against infection. From 5 to 10 c.c. may be injected in this way.

1 in 1,000 solution with sodium chloride 0.8 per cent. solution for washing out a wound and the free incisions into the tissues round it.

1 in 1,000 solution for addition to sodium chloride 5 per cent. solution or sodium citrate 0.5 per cent. solution or to a mixture of hypertonic saline solution and citrate solution. (In this strength flavine is not precipitated by either of these drugs.)

1 in 1,000 solution injected intravenously. It has no toxic action on any special organ. 300 c.c. have been injected without ill effect.

FORMALDEHYDE. CH_4O .

Liquor Formaldehydi.—Contains 35 per cent. to 40 per cent. of the gas.

This drug has been used with great benefit in Kala Azar.

Dose.—From 18 c.c. of a 1 in 4,000 solution, to 34½ to 34 c.c. of a 1 in 2,000 solution.

Method of use.—Intravenous injection.

FORMALDEHYDE SODIUM DISULPHATE.

Has the advantages over formaldehyde in being more stable and of crystalline form. It is being tried in place of formaldehyde in the treatment of Kala Azar.

FRIAR'S BALSAM. (Tinct. Benzoin. Co.)

A solution of 1 in 8 of castor oil or glycerine may be used in purulent cavities after incision on gauze drains.

GAGLI'S FORMULA. *See Quinine.***GALYL.** Tetroxy-Diphosphamine-diarsenobenzene.

First devised and prepared by Mouneyrat. A light yellow powder which dissolves readily in distilled water giving a clear, olive-yellow, transparent solution of neutral re-action. Some ampoules give a slightly hazy solution. The ampoules are made up with the appropriate amount of sodium carbonate. It contains 35.3 per cent. of arsenic and 7.2 per cent. of phosphorus. "It is the safest arsenical compound to use in place of salvarsan and neosalvarsan." (McDonagh). As compared with these drugs it is not so potent and more toxic, so that not so many injections can be given and a longer interval between them is necessary. As administered, it contains only half as much arsenic as there is in salvarsan and neosalvarsan.

Dose.—0.008 to 0.0085 grammes per kilo of body weight. Give 0.3 grammes in the first four doses, 0.4 grammes in the last two doses.

Method of use.—Intravenous injection is the only convenient way of giving galy. It may be given in a concentrated solution by means of a 10 c.c. piston syringe or more dilute with a burette apparatus. The latter is the preferable method.

30 c.c. of distilled water are used to dissolve each 0.1 gramme, *i.e.* 150 c.c. for 0.5 gramme of galy.

Subarachnoid injection in Sleeping Sickness will not sterilize the cerebro-spinal fluid.

GALYLIZED SERUM.

For intrathecal injection. Do not withdraw blood from the patient for the preparation of this serum until a week after the injection of the galy.

In the treatment of Syphilis a minimum of three full doses of GALYL at weekly or fortnightly intervals, followed by treatment with mercury and iodides for two years. After two months' rest, an examination for the Wasserman re-action should be made.

Do not give more than six consecutive injections and allow at least a week to intervene between each. After the fourth injection keep a look out for arsenical dermatitis.

REFERENCES.—McDonagh, J.E.R., Practitioner, Dec., 1915.

Kapke, A., 1916.

GELATIN.

Has been given in order to decrease hæmorrhage, *e.g.* in Gastric Ulcer and in order to increase the viscosity of the blood in Cholera and Snake Bite.

Dose in Cholera.—1 to 2 grammes daily, given dissolved in water at 40° C.

Methods of use.—Subcutaneous injection. Intramuscular injection. By the mouth (1 ounce to 1 pint of water.)

GLUCOSE.

Has been used with benefit in the surgical treatment of badly infected wounds and in exhausting diseases.

For the *surgical treatment* of wounds the following formulæ are useful :

R

Saturated solution of glucose in water.

Carbolic acid 1 in 80 of the whole formula.

R

In suppository form inserted into the wound.

Used in either of these ways, it produces a great degree of lymph lavage.

In exhausting diseases the following formulæ are of service :

R

From 2 per cent. to a 5 per cent. solution of grape sugar.

Dose and method of use.—1 litre by subcutaneous injection.

R

From 5 per cent. to 7 per cent. of grape sugar.

Dose and method of use.—Dissolve the sugar in 0.9 per cent. sodium chloride solution. Filter. Boil. Add 4 to 8 minims of adrenalin in solution (1 in 1,000). Inject intravenously.

The exhibition of this drug with the administration of protein food in a peptonised form is recommended by Balfour in those diseases of the tropics in which acidosis is the common feature. See under calcium chloride.

Isotonic solution $4\frac{1}{2}$ per cent., Hypertonic solution 5 per cent. to 10 per cent.

It may also be given injected intravenously with lecithin.

GLYCERINE.

One of the properties of glycerine is, that 69 parts of it by weight will absorb 31 parts of water. After this amount of water has been absorbed, any excess evaporates.

Solutions for dressing wounds :

Glycerine	...	...	...	...	2,000 parts
Water	...	...	...	...	1,000 parts
Hydrag. perchlor.	...	...	...	...	1 part

i.e. Add to pure glycerine half its volume of 1 in 1,000 perchloride solution.

Method of use.—Wash out the wound with hot water. Then with 1 in 1,000 perchloride solution. Dress with lint, soaked in the above solution. Mackintosh. Lint. Bandage.

GLYCERINE AND ICHTHYOL.

A mixture of equal parts of these drugs has been found useful in the treatment of wounds where the indication is to produce a healthy granulating surface. This it does in a few days.

Method of use.—Paint the wound and the skin round it with the mixture. When changing the dressing, dry off with a swab or dab the surface with sp. vini. rect. Keep the wound dry. If the dressing stick, wash it off with freshly boiled water. Syringe sinuses with sp. vini. rect., and put in a drain of gauze soaked in the mixture. Do not use drainage tubes. If the sp. vini. rect., cause irritation, use instead, the following alcoholic solution of methylene blue.

R

Meth. blue	...	...	...	...	4 grains
Alcohol	...	...	...	...	1 ounce

Precipitation of the methylene blue occurs in the presence of the ichthyol, but it is of no consequence. Do not remove ichthyol from the skin at each dressing.

REFERENCE.—Duggan, C.W., Practitioner, Jan., 1916, pp. 118–119.

GOLD, COLLOIDAL. “Collobaise Dausse.”

This has been given by intravenous injection in Pneumonia, with beneficial results.

GRAY'S SOLUTION.

See Novocaine.

HAFFKEIN'S SERUM.

This is used in inoculations against plague.

Dose.—5 c.c.

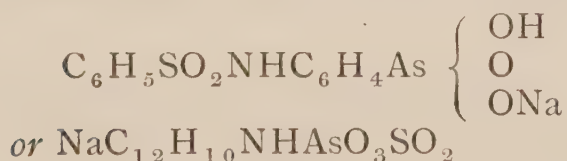
Method of use.—Subcutaneous injection under the skin of the shoulder or abdomen.

A few hours after inoculation, a painful swelling occurs round its site. The lymphatic glands that drain the site of inoculation swell slightly. The temperature rises to 38° C. In thirty-six hours these symptoms should have disappeared. Immunity is established as soon as the temperature falls, and lasts at least a year.

The vaccine is prepared by growing the *B. Pestis* in a butter broth for four weeks. Killing them by heat. Adding carbolic acid.

HECTINE.

Sodium benze.sulpho.para.aminophenyl.arsonate



Colourless, needles, very soluble in water. Contains 21 per cent. of arsenic.

The drug is an anti-hæmolytic, and one that favours leucocytosis. It has been employed with benefit in severe cases of intractable Syphilis in the secondary and tertiary stages. It has also been used in the treatment of Leishmaniasis. In Kala Azar, the fever is not affected but the general glandular enlargement diminishes and the enlarged spleen is reduced in size.

Dose.—0.1 to 0.2 grammes. 0.008 gradually increased to 0.001 grammes to a child of 8.5 kilos ; given daily every day for ten days.

In children 0.01 grammes per kilo body weight twice a week when used for the subcutaneous injection in the neighbourhood of Oriental Sores.

Methods of use.—Subcutaneous injection. Intramuscular injection.

In Kala Azar, one injection is given every day for ten days. The patient then has a fortnight's rest from treatment after which he is given another course of injections.

In Oriental Sore, if subcutaneous injections are made around the affected area before ulceration has taken place, the disease is aborted and healing takes place at once without the formation of a scar. If ulceration has set in, the process is arrested and healing takes place with the formation of a scar.

Trade.—The drug is put up in sterile ampoules containing 0.2 grammes in 1 c.c.

HEDDAEU'S METHOD.

See Tetanus Antitoxin.

HYDRARGYRUM.

MERCURIAL CREAM.

The following formulæ are of service :—

Pure redistilled mercury	...	48 grains
Sterilized anhydrous lanolin	...	2 drachms 240 grains
Olive oil <i>q.s.</i> to produce	...	1 fluid ounce

Dose.—5 to 10 minims once a week by intramuscular injection.

LAMBKIN'S FORMULÆ :

Mercury ...	...	...	...	2 drachms
Anhydrous lanolin	...	...	...	2 drachms
Parolein ...	...	...	...	4 drachms
Carbolic acid	...	...	...	2 per cent.
Mercury ...	...	...	...	10 grammes
Creosote ...	...	...	...	20 c.c.
Camphoric acid ...	...	...	...	20 c.c.
Palmatin basis to	...	...	...	100 c.c.
Calomel ...	...	...	...	5 grammes
Creosote ...	...	...	...	20 c.c.
Camphoric acid ...	...	...	...	20 c.c.
Palmatin basis	...	...	...	100 c.c.

Dose.—10 minims=0.6 milligrammes.

HYDR(AYRGRUM)IONS OR HYDRIONS.

Under this name, Lissaman reports good results from treatment of septic wounds of his solution which is prepared as follows :—

R

HgCl ₂	Mercuric chloride	4.375 grains	0.283 grammes
CaCl ₂	Calcic chloride	1.86 grains	0.12 grammes
NaCl	Sodic chloride	34.76 grains	2.252 grammes
KCl	Potassic chloride	0.075 grains	0.005 grammes

These are added to one pint of cold water and applied cold, on a compress covered with rubber, to the wounds to be treated.

REFERENCE. Lissaman, Thomas, *Lancet*, Dec. 19, 1914, pp. 1438 to 1440.

HYDROGEN PEROXIDE.

(See also Sodium Perborate).

This is an unstable drug capable of liberating from ten to twenty times its own volume of nascent oxygen; by virtue of this fact it is an excellent oxidising agent. It has the additional value of being unirritating; it is possible to employ it even in the peritoneal cavity.

For tropical use, the drug should be stored in spring clip rubber stoppered bottles.

A German preparation named Perhydrol which was on the market for tropical use before the war, is capable of involving 100 volumes of oxygen.

The solution for routine use is :

R

Hydrogen peroxide	...	...	...	...	1 part
Water	...	...	...	...	2 parts

The drug is of especial value in gas gangrene. A circular row of injections is made into, round and above the crepitating tissues. (First make the solution alkaline with sodium bicarbonate).

A dessicated plug of wax in the ear may be softened and broken up by means of the drug.

IODINE.

Has about the same antiseptic power as carbolic acid. The 2 per cent. solution in common use is about as powerful as 1 in 50 carbolic.

It is a good antiseptic for joints. The joint may be alternately swilled out with 2 per cent. iodine solution and normal saline. The process may be repeated as often as necessary, the joint being loosely closed without a drain.

A 2 per cent. iodine spray is better for disinfecting purposes than the usual application by painting.

When an alcoholic solution of iodine is used for painting the skin, the skin should be dry, otherwise it will be blistered. After iodine has been painted on the skin, it may be fixed by the following varnish :

R

Turpentine	...	...	...	...	1 part
Colophony	...	...	...	...	50 parts
Ether	...	...	...	...	50 parts

If skin so painted is thereby prevented from sweating, this varnish might be used with advantage in the tropics. It is possible to add the iodine to the varnish so that only one painting operation is necessary. The varnish may be removed from the skin by a swab of cotton wool slightly moistened with benzine.

Alcoholic solutions of iodine in the tropics should be kept in spring rubber stoppered bottles.

ALCOCK'S IODINE SOLUTION.

Tinct. iodi (B.P.)	...	...	...	9 parts
Methyl alcohol	...	...	...	98 parts

MARC PEZZOLO'S SOLUTION.

Is a 4 per cent. solution of iodine in methyl alcohol.

The methyl alcohol should contain 1.5 per cent. to 2 per cent. of acetone and the solution should be freshly prepared.

IODINE AND CALOMEL SOLUTION.

Stewart, D. H., of New York, finds that the addition of calomel very greatly increases the antiseptic power of iodine. He recommends the following formula :

Calomel	...	...	...	...	1 part
Tr. iodi	...	...	...	...	1,000 parts
Water	...	...	...	...	15,000 parts

Method of use.—Clean the wound and fill it with this solution. Dress and drain it with toilet paper, *i.e.*, wood pulp.

The skin should be cleansed with soap and water some time before the iodine is applied, for the epithelial cells swell up when so washed, with the result that the iodine solution cannot enter between their interstices.

IODOFORM.

A 2 per cent. solution has been used as an injection into the inflamed lymphatic glands in cases of Tropical Buboe.

The following formula has been used with benefit in Leprosy :

Iodoform	...	...	...	...	10 parts
Olive oil	...	...	...	...	90 parts

It has been given by intramuscular injection.

Dose.—1 c.c.

Technique of preparation :

Add the iodoform to the heated oil. Cool. Stir with a glass rod.

The following formula has been used in the treatment of Leprosy :

R

Iodoform thoroughly powdered $\frac{1}{2}$ grain
Liquid paraffin 3 minims
Ether 8 minims

Dose.— $\frac{1}{2}$ grain twice a week at first and gradually increased to 1 grain five times a week later on.

Method of use.—Intravenous injection.

This treatment is combined with the local injection into each nodule of from 10 to 30 minims of the solution.

Technique of the injection :

Take a half grain tablet of iodoform. Powder it thoroughly and place it in the syringe. Draw into the syringe 3 minims of liquid paraffin. Draw into the syringe 7 minims of ether. Seal the needle with lanolin to prevent evaporation of the ether. Shake the syringe until the iodoform dissolves.

Courtney, B. J., *Lancet*, June 27, 1914.

iodoform emulsion.

The following formulae are useful :

R

Iodoform	...	...	...	...	10 parts
Glycerine	...	...	...	...	90 parts

R

Iodoform	...	...	...	...	10 parts
Olive oil	...	...	...	...	90 parts

R

Iodoform	...	...	...	...	5 parts
Ether ...	...	...	...	...	95 parts

Method of use.—Inject into cavities.

iodoform and bismuth paste. (Kocher's).

R

Bismuth subnitrate	...	...	2 parts
Iodoform	...	...	1 part
Lot. hyd. perchlor	...	...	q.s. to make a paste

IODONE INJECTABLE ROBIN.

This drug has been injected with benefit in Kala Azar.

Dose.—0.1 grammes in 1 c.c.

REFERENCE : Quilichini Bul. Soc. Path. Exot. 1913, Vol. 6, No. 7, pp 495 to 498.

IRON ARSENITE.

Has been given with benefit in Pellagra.

Method of use and dose.—Injections of 16 minims alternately with sodium cacodylate $\frac{3}{4}$ grains.

REFERENCE : Niles, George M., Jl. Amer. Med. Assoc., Jan. 24, 1914, Vol. 62, No. 4, pp. 285 to 287.

KHARSIYAN.

A yellow powder, does not dissolve readily. Not so good as salvarsan.

Technique :

Pour the powder on three dozen glass beads in a large flask. Shake. Add 20 c.c. of freshly made saline. Shake. Add more saline, shaking well until 100 c.c. are made up. Neutralize with NaOH 4 per cent. solution. Inject intravenously at body temperature.

KOCHER'S IODOFORM AND BISMUTH PASTE.

See Iodoform.

LUARGOL. Or 102.

A preparation of Danysz.

Dioxy.diamino.arseno.benzol.stibico.silver.

Formula :



It contains :—

Carbon	...	...	...	...	19.88 per cent.
Silver	...	...	...	...	7.45 per cent.
Bromine	...	...	...	...	5.52 per cent.
Arsenic	...	...	...	...	20.70 per cent.
Antimony	...	...	...	...	8.29 per cent.
Sulphur	...	...	...	...	8.86 per cent.

In Sleeping Sickness, it is seventy-five times more active than atoxyl, and it has the advantage that its therapeutic dose is far removed from its toxic dose.

A light yellow-orange powder insoluble in water. It is very stable and will keep in solution for many hours without change.

Dose.—0.10 to 1.50 grammes.

The injections are commenced using the smaller dose and are given every second or third day until, by the sixth or seventh injection, the full dose is given.

Method of use.—Intravenous injection. It is soluble in a solution of sodium hydrate.

1 gramme of luargol neutralizes, 0.4 centigrammes of sodium hydrate.

Ravault's method :

Take of a 4 per cent. solution of NaOH	...	15 c.c.
Add luargol	... ..	1 gramme

A thick black solution results, which may be injected by a syringe.

Dilute method :

Or a more dilute solution may be used for injection ;

Sodium hydrate 1 per cent. solution	...	15 c.c.
Distilled water	... ..	100 c.c. or 1,000 c.c.
Luargol	... ..	1 gramme
Filter.		

Preparation of the patient :

No food is given for four hours before the injection. The patient rests for a few hours and has no food for four hours after the injection.

From 5 to 6 p.m. will usually be found to be the most convenient time to give the injection, for then the patient rests during the whole of the night.

Contraindications :

Asystoly, uraemic cacchexia, the acute meningitis, nephritis or jaundice of Syphilis.

In these conditions the dose should be reduced to from 0.006 to 0.003 grammes.

Precaution :

The sodium hydrate should be chemically pure and free from the carbonate.

Re-action :

After the first dose there is usually a re-action with vomiting, headache and gastro-intestinal troubles ; this is probably due to the destruction of *Spirochaetes* and is never very serious.

Results :

Primary, secondary and tertiary symptoms yield in a few days. Eighty per cent. of cases treated, show a negative Wassermann's re-action for one month afterwards but in a few months it may become positive again.

SODIC LUARGOL. Also of Danysz.

This is soluble in water and is put up in tubes ready for use.

The dose is the same as that of luargol.

LUETIN. (Noguchi.)

This consists of dead cultures of the *Treponema Pallidum*.

When injected intradermically, an inflammatory area appears at the site of inoculation in most cases of tertiary, hereditary and latent Syphilis.

LUDYL. Or I,151.

Devised and studied by Mouneyrat, who obtained good results from it in Syphilis, Trypanosomiasis, Relapsing Fever and Yaws. In Yaws, he succeeded in curing the disease by its means.

Dissolve in 15 to 20 c.c. of water. Filter. Inject intravenously before a meal.

Dose.—Adults, first injection 0.4 grammes. Increased after an eight days' interval to 0.5 grammes.

The solution is unaffected by light so that ten doses may be made up at a time if desired.

The general re-action after the injection of ludyl is much less than that caused by either salvarsan, neosalvarsan, or galyl. There are usually fever, headache, vertigo, and diarrhœa. The urine is never affected.

For comparative sterilizing dose in the Trypanosomiasis of white rats, with this and other drugs, *see* Atoxyl.

LYSOL.

A derivative of coal tar, freely soluble in water. The solution is somewhat sticky, this is an advantage as the drug remains longer applied to the affected part.

Method of use.—A 2 per cent. solution is used for syringeing out cavities, such as the vagina and external auditory meatus.

Continuous bath for very dirty wounds :

R

Lysol	...	...	...	...	...	$\frac{1}{2}$ drachm
Water	...	...	...	...	...	1 pint

Has been given as a subarachnoid injection in Sleeping Sickness but is useless as regards the sterilization of the cerebro-spinal fluid. (Kopke, 1916.)

MAGNESIUM CHLORIDE.

Solutions of this drug in various strengths have recently come into use in the treatment of wounds.

(1) Rosenblith's stock solution :

Magnesium chloride	...	...	250 grammes
Boiling water	...	...	1 litre

(2) Delbet's solution 17.5 per 1,000 of the crystalline salt, *i.e.*

Mag. chlor. cryst.	...	...	18 grammes
Sterilized water	...	...	1,000 grammes
or 12.1 per 1,000 of the anhydrous salt.			

Methods of use :—

- (a) Subcutaneous injection of 80 c.c. in Erysipelas.
- (b) Wet dressings.
- (c) Irrigation of septic cavities and joints.

“When I compare the results I obtained with the wounded from the battle of the Marne, which I treated with antiseptics with those I have recently obtained with the wounded from the battle of Champagne, treated with the solution of magnesium chloride, the conclusion that a great advance has been made has been forced upon me.” (Pinard).

REFERENCE.—B. M. J., Dec. 11, 1915. M. Pinard at a meeting of the Academie.

MAGNESIUM SULPHATE.

Has been used with great benefit in the treatment of Tetanus.

Doses :

- (1) $\left\{ \begin{array}{l} 0.45 \text{ to } 4.0 \text{ grammes} \\ 0.5 \text{ to } 0.7 \text{ grammes per kilo. body weight in children.} \end{array} \right.$
- (2) 1 c.c. of 25 per cent. solution for every 25 lbs of body weight. (*i. e.* 5 to 6 c.c. for an ordinary adult) every six hours.
- (3) Or 20 c.c. of a 10 per cent. or 15 per cent. solution for subcutaneous injection, three or four times a day.
- (4) One to two pints of a 1 per cent. to 2 per cent. solution every three hours if necessary, subcutaneously.
- (5) If there is immediate danger, an intravenous injection of a 3 per cent. (isotonic) solution at the rate of not more than 5 c.c. per minute.
- (6) Severe cases, intrathecal injection 1 c.c. for every 10 kilos. of body weight repeated if necessary.

Methods of use.—The drug may be given by subcutaneous or by intrathecal injection. It may also be given intravenously under ether anaesthesia.

The drug must be considered as a symptomatic aid. Small doses are useless, while large arrest breathing. The drug best counteracts the excessive accumulation of waste products in the muscles from their intense and prolonged contraction.

Intrathecal injections are of the greater value, but subcutaneous injections are simpler to administer especially when skilled assistance is not available.

The respiration must be closely watched during treatment. The danger symptom is apnœa.

As antidotes if respiration fail :

Calcium chloride 5 per cent. solution 5 c.c. injected subcutaneously.

Chloral 0.3 to 0.9 grammes per rectum

or Physostigmine 1 milligramme injected subcutaneously may be given.

Artificial respiration may be necessary, while these drugs are coming into an action or even the intratracheal insufflation of oxygen or air (an ordinary pair of bellows will do). If profuse bronchorrhœa, give atropine.

For cardiac exhaustion, camphor should be injected subcutaneously. *Intravenous injection of the drug is rapidly fatal.*

Magnesium Sulphate.—Has also been used in the dressing of infected wounds. The following advantages are claimed for the drug when used for this purpose ;

It interferes with the digestive activity of pus. It has no great inhibitory action on leucocytes. As it is the least absorbed of all the absorbable salts, the granulations formed in its presence are consequently less œdematous. It inhibits the growth of streptococci, *B. Coli*, and *B. Pyocyaneus*. It promotes "lymph lavage."

It has also been used prophylactically where Cellulitis or Erysipelas have been threatened in an area contiguous to a septic wound.

Method of use.—A saturated solution applied as a compress, covered with mackintosh, to the threatened area. The compress to be wetted every two hours and re-applied every twelve hours. There should be no delay in re-applications and the area threatened should not be washed during treatment.

MARC PEZZOLO'S SOLUTION. *See Iodine.*

MASTIC.

Mastic in tears	...	...	...	...	20 grammes
Benzol...	...	...	...	...	50 grammes
Linseed oil	...	...	...	...	20 drops
Colophonium	...	...	...	...	10 grammes
Venetian turpentine	...	...	...	...	7 grammes

Dissolve in the benzol and keep in a corked bottle.
(N.B.—A rubber cork is dissolved by the benzol.)

ANOTHER FORMULA :

Mastic ...	...	...	...	...	...	20 grammes
Colophonium ...	...	...	...	...	...	20 grammes
Castor oil ...	...	...	...	...	...	3 grammes
Benzol ...	...	...	...	...	...	56 grammes
Salicylate of methyl (Oil of winter green) ...						1 gramme

ANOTHER FORMULA :

Mastic.	...	...	...	...	...	45 parts
Benzol	...	...	...	...	...	54 parts
Picric acid	...	...	...	...	...	1 part

REFERENCE.—Vrijhoef, H.C., Tijdschr v. Nederl, India, 1914, pp. 718 to 724.

MENCIERE'S SOLUTION.

Iodoform	...	...	...	...	...	10 parts
Guiacol ...	...	...	...	...	...	10 parts
Eucalyptol	...	...	...	...	...	10 parts
Balsam peru	...	...	...	...	...	10 parts
Ether ...	...	...	...	...	...	100 parts

Method of use.—Wash the wound with 1 in 1,000 perchloride; then with 1 in 40 carbolic; then with 1 in 3 peroxide; apply Menciaere's solution on lint.

MERCURY BICHLORIDE.

Syn : Hydrarg. perchlor. Mercuric chloride.

This is of no use as an antiseptic in the presence of albumen.

In Malaria :

The injection intravenously of $\frac{1}{4}$ grain cured a heavy infection of the Tertian parasite (Barlow).

Or $\frac{1}{8}$ grain in 10 c.c. normal saline.

This drug is useful in Malaria used in conjunction with treatment by quinine.

The complications of treatment are salivation, albuminuria, local phlebitis and diarrhœa. These are all of them transient symptoms. The exhibition of the drug is especially useful in the treatment of case with an enlarged malarial spleen.

MERCURY BINIODIDE.

Potassio-mercuric iodide.

This is a more powerful antiseptic than the perchloride ; it does not coagulate albumen and is less irritating to the skin. It is of no use as an antiseptic when the organisms are present in an oily medium, as it does not dissolve in oil.

Method of use.—

As a skin disinfectant :

Soloids ...	...	...	...	...	2 in number
Distilled water		...	...	...	5 ounces
Sp. meth.	...	...	...	...	15 ounces

MERCURY OXYCYANIDE.

This drug has the following advantages :

It is strongly antiseptic. It has no caustic action. It does not precipitate albumen. It does not attack instruments and other metal articles.

METOLEINE.

This is a trade name that has been given to preparations of metals and metalloids, finely pulverized and suspended in olive oil.

Arsenic métoleine contains 8 per cent. of metallic arsenic.

Antimony métoleine contains 20 per cent. of metallic antimony.

Both of these drugs have been given in Sleeping Sickness with marked trypanocidal effect.

NEOKHARSIYAN.

A British substitute for neosalvarsan. A reddish-brown powder, readily soluble in water forming a reddish-brown solution.

Method of use.—It is injected cold intravenously in 10 c.c. of water.

NEOSALVARSAN.

Erlich-Hata remedy 914. Sodium dioxy.diamino.arseno. benzine.mono methane sulphonate.

Formula $C_{12}H_{11}O_2As_2N_2CH_2O.SONa$.

A yellow amorphous powder with a distinctive odour.

The drug is one third weaker than salvarsan. It dissolves readily in water forming a clear, yellow, neutral solution. Soluble in 0.4 per cent. salt solution, but forms a cloudy solution in 0.8 per cent. saline. It possesses a great tendency to oxidation.

Has been given with great benefit in the following diseases :

Syphilis and Yaws, Blackwater Fever (Burkitt), Amœbic Dysentery (Willets ; Valencia), Pellagra, Typhoid Fever.

Dose.—0.6 to 1.5 grammes (9-22½ grains). Usual dose 0.9 grammes.

Method of use.—Intravenous injection in 10 c.c. of cold, distilled and sterilized water.

Rectal injection. Da Matta has used it in this way in Yaws, in doses of 0.5 grammes, obtaining improvement in four days and a cure in eight days. This case was still found to be without symptoms of the disease ten months later.

Intramuscular injection. May be given either in a watery solution or suspended in oil ; both methods are painful.

Subarachnoid injection in Sleeping Sickness will not sterilize the cerebro spinal fluid (Kopke, A., 1916).

In the treatment of Syphilis :

The first injection is followed by three more ; on the eighth or tenth day, on the twenty-fourth day and on the thirty-eighth day after the first injection, the dose being increased at each injection by from 0.45 to 0.9 grammes.

Immediately after the first injection of neosalvarsan an injection of mercury salicylate is given, 10 minims of a 10 per cent. to 20 per cent. emulsion. This injection is repeated every week until from ten to fifteen injections are given in all.

This constitutes "one course." The safest plan is to extend treatment over three years.

REFERENCES.—Burkitt, R. W., *Lancet*, May, 1915, p. 908.

Willets, David G., *Phillipine Journal of Science*, Sect B., Trop. Med., Feb., 1914, Vol. 9, No. 1, pp. 93 to 117.

Da Matta, Alfred A., *Revista Med. de S. Paulo*, Sept. 15, 1913, Vol. 16, No. 17, pp. 314 to 316.

As regards the exhibition of this drug in the treatment of Relapsing Fever, the same remarks apply as have been made under salvarsan.

NOVOARSENO-BENZOL. (Billon.)

A yellow powder, somewhat darker than 914. It dissolves readily in water forming a clear yellow solution. Has been given with benefit in Oriental Sore, in which disease only one or two injections are necessary to bring about a cure.

Dose.—0.1 gramme per kilo. body weight.

Method of use.—Dissolve the dose to be given in 10 c.c. of freshly distilled cold water and inject cold in order to obviate oxidization.

NOVOCAINE.

A non-toxic local anæsthetic, which does not produce any local irritation. Aqueous solutions of the drug are neutral in re-action and may be sterilized by boiling without decomposition. The solutions in use vary in strength.

$\frac{1}{4}$ to $\frac{1}{2}$ per cent. solution for infiltration anæsthesia and for the anæsthesia of thick layers of tissue.

$\frac{1}{4}$ to 2 per cent. for hypodermic use.

1 to 2 per cent. isotonic solutions are employed for the anæsthesia of the larger nerve trunks and in dental practice.

5 per cent. solution for medullary anæsthesia.

5 to 10 per cent. solutions are employed in ophthalmic practice and for operations on the ear, nose and throat.

10 to 20 per cent. solutions for anæsthesia of the larynx and pharynx.

Instruments used for the injection of novocaine should be free from alkali. Novocaine is precipitated by alkalis.

Gray's solution :

Novocaine	...	...	...	0.25 per cent.
Potassium sulphate	...	...	...	0.4 per cent.
Adrenalin	...	...	...	12 drops of the synthetic solution to each 100 c.c.

This solution is used preparatory to abdominal section. The contained potassium sulphate prolongs the anæsthetic effect of the novocaine. No œdema or sloughing follows, and up to 200 c.c. of the solution may be employed.

Isotonic solution :

Novocaine	...	...	...	2 grammes
Sodium chloride	...	...	...	5 grammes
Aq. dest.	...	...	...	100 c.c.
Adrenalin	...	...	...	5 drops of a 1 in 10,000 solution to each 20 c.c. immediately before use

<i>or</i> Novocaine	...	...	...	0.25 to 0.5 grammes
Warm normal saline	...	...	...	100 c.c.
Adrenalin (1 in 1,000)	...	...	...	5 drops

These solutions are used for infiltration anæsthesia. The anaesthesia begins a quarter of an hour after injection and lasts half an hour.

O 1.

A derivative of di.amino.arseno benzine.

Dose.—0.1 to 0.15 grammes per kilo. body weight.

This drug has no advantages over arsono.phenyl. glycin.

OK 1.

A derivative of di.amino.arseno.benzine.

A yellow powder which keeps well in air, very soluble in distilled water.

Experiments on animals tend to shew that this drug has a great trypanocidal effect.

REFERENCE.—Mesnil, F., and Motais F., Bull. Soc. Path. Exot., Jan., 1915, Vol. 8, No. 1, pp. 28-30.

OLEUM SINAPIS.

This drug has a selective anæsthetic effect on the trigeminal nerve, though it is of no service in trigeminal neuralgia.

Method of use.—Hold the drug to the nose and inhale, closing the eyes to avoid conjunctivitis.

Inhale with the nostril of the side on which anæsthesia is required, closing the other.

If anæsthesia is required on both sides, inhale first through one nostril and then through the other.

The inhalation is continued until violent coughing is provoked.

Results. In toothache, immediate relief for several hours. In earache, strikingly effective. Paracentesis of the tympanum can be performed in children under its anæsthetic effect. Otalgia, tinnitus and post operative pain in the ear vanishes.

Tonsillectomy may be performed under its use without pain and without subsequent dysphagia for from one to eight hours after its use.

OMNOPON.

Dose.— $\frac{1}{2}$ to $\frac{2}{3}$ grains hypodermically.

ORPIMENT.

See Atoxyl-orpiment.

PARAFFIN WAX.

Is used for plastic operations, *e.g.*, on the nose; that with a melting point of about 115° F. is required. It is injected by means of pressure syringe. (Mahn.)

PAROLEIN.

A dressing of gauze soaked in parolein prevents excoriation of the skin in pancreatic fistula.

PENNA'S METHOD.

See Yersin's serum.

PHENOCOLL.

Has been tried in the treatment of Elephantiasis.

REFERENCE.—Leber, A., Arch. f. Schiffs u., Trop. Hyg., July, 1914, Vol. 18, No. 13, pp. 454 to 463.

PHENOL CAMPHOR.

See Acid Carbolic.

PITUITARY EXTRACT.

A 20 per cent. extract of the posterior lobe of the pituitary body.

Dose.—1 to 2 minims.

Effects of the drug and indications for its use. Pituitary extract causes contraction of the muscular coats of the arteries by peripheral action. Its effects are more prolonged and lasting than those of Adrenalin.

Atrophy of the pituitary body is followed by a disease "Adiposogenital dystrophy." In this condition, the exhibition of pituitary extract has been followed by the diminution of obesity and increase of sexual power.

Pituitary extract has great and prolonged effect on the arteries. In shock, when the arteries are relaxed, it improves their tone and this again improves the heart beat. It gives good results in amenorrhœa, in backward sexual development and in cases of mal-development of the mammæ. In the neurotic and neuras-

thenic states of some women it does good. It is a valuable remedy in cases of Pneumonia with low blood pressure. In the paresis of the muscular coats of the intestine, for instance, after abdominal operation, it is the most valuable remedy we have. It intensifies and prolongs the uterine contractions of labour but its exhibition will not induce labour. It increases the excretion of the urine and of milk.

This drug has been given with benefit in cholera by intramuscular injection in bad cases. Subcutaneous injection in convalescents.

The injection of pituitary gland extract is best given intramuscularly in order to avoid the sloughing liable to follow the local vaso-constriction. The dose may be repeated in an hour's time. The activity of the extract is not impaired by boiling.

In cases of snake-bite, the drug may be given in doses of 1 c.c.

PNEUMOSAN.

This drug has been used with benefit in Tuberculosis. It is possible that it might prove of equal benefit in Leprosy.

POTASSIUM PERMANGANATE.

A powerful oxidizing agent acting more slowly than hydrogen peroxide.

A 1 in 500 solution is recommended in the following conditions :

Sloughing tropical ulcer. Cancrum oris. Bed sores. Secondary infection of liver pus in amœbic abscess. Anti-tetanus prophylaxis. Suppurative onychia.

This solution may be used for bathing the affected part, for continuous irrigation or as a wet dressing covered with mackintosh.

A 1 per cent. solution may be used for sponging in operations on the above condition.

The local application of the crystals in snake-bite remains the only practical measure in the vast majority of cases. The wound is scraped with a clean knife and the crystals are rubbed in.

The crystals, when applied to a scorpion sting, give great and instantaneous relief.

POTASSIUM PERMANGANATE AND HYDROCHLORIC ACID.

Solution A. pot. permang.	1 per cent.
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Solution B. acid hydrochlor	$\frac{1}{2}$ per cent.
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Add A. and B. together just before use.

A nascent chloric compound is formed which is strongly antiseptic, stronger even than 1 in 20 hydrarg. perchlor.

This mixture is also useful for sterilizing the skin and utensils, and for cleansing dirty wounds, but in the last case the cleansing must be done under an anæsthetic as the process is very painful.

QUININE.

Methods of use :

By the mouth ; by the rectum ; Subcutaneous injection ; Intramuscular injection ; Intravenous injection.

It is seldom given by subcutaneous injection and unless given in great dilution, *e.g.*, 1 in 150, it is useless (MacGilchrist).

The following salts may be given by intramuscular injection :

The bihydrochloride. The basic formate—quinoform—Balfour favours the use of this salt. The carbamid dichloride ; quinine and urea hydrochloride. The cacodylate. The hydrochloride.

The basic pseudo-solution, strength 2-3 milligrammes in 1 c.c.

Dose.—2 to 4 c.c. repeated if necessary next day or half the strength may be given on three consecutive days.

Quinine and sodium bromide.

Quinine hydrochloride	1.0 to 1.75 grammes
Sodium bromide	...	...	1.0 to 1.75 grammes
Distilled water (fresh)	...	...	1 litre

Bacelli's formula.

Quinine	...	...	...	...	10 grammes
Sodium chloride	...	...	...	...	0.75 grammes
Water	...	...	...	...	10 grammes

Sterilize very carefully.

Dose.—One-tenth part for each injection.

Gagli's formula.

Quinine hydrochlor...	...	...	10 grammes
Aqua dest.	...	...	18 grammes
Ethyurethane	...	...	5 grammes

Dose.—One-twentieth part for each injection.

(1.5 c.c. contain 0.5 grammes of quinine.)

Dose.—Intramuscular injection, 1—2 grammes in 10 c.c. of water.

Trade.—Sterilettes containing $\frac{1}{2}$ gramme or 7.5 grains and 1 gramme or 15 grains are made by Squire and Sons, and Martindale, both of London.

Another method of administration.—It may be given by a method of alternating salts, *e.g.* :—

Quinine hydrochlor.	...	15 grains
Quinine cacodylate	...	4 grains on alternate days

The exhibition indiscriminately in all fevers may do harm in Tuberculosis, Appendicitis, Endocarditis, Septic Cholecystitis, Pyelitis.

QUININE HYDROCHLORIDE.

Has been used in the treatment of wounds. It is said to possess the following advantages :

It is highly bactericidal. It is an antiferment. It does not combine with proteins, consequently its activity is not lessened by the presence of serum or pus. It is non-irritant. It is non-toxic. It is not very expensive. It is stable.

The following solutions are recommended :

A 1 per cent. solution in cold boiled water ; used as a dressing or as an instillation.

Quinine hydrochloride	...	...	1 part
Hydrochloric acid	...	...	1 part
Water	...	...	1,000 parts
Quinine hydrochloride	...	...	1 part
Alcohol	...	...	10 parts
Water	...	...	1,000 parts

These two formulae may be used by the continuous drip method.

Technique of the intramuscular injection of quinine :

Cleanse the skin. Break the vial containing the solution. Draw the contents into the syringe. Inject, preferably into the gluteus maximus muscle. Withdraw the needle. Apply a pad of cotton wool soaked in 1 in 40 carbolic lotion to the site of inoculation.

There is no fear of subsequent abscess formation or of the development of Tetanus. In old and feeble subjects, give a preliminary hypodermic injection of ether. If hard swellings appear, stop the injections for a few days and apply an ice bag to them. A trace of carbolic acid in the injections does no harm and does not interfere with the action of the quinine.

Subcutaneous injection. Of no use unless in great dilution, *e.g.*, 1 in 150 ; of no use in malignant cases. Called for where the doses given by the mouth are vomited.

Tetanus has followed the intramuscular injection of quinine. There are two theories to account for the development of this disease namely :

1. Faulty technique on the part of the operator.

2. The formation in the body of a necrotic area in which tetanus spores, already circulating, find a suitable nidus for growth. Sir David Sample and Vincent conclude that the intramuscular injection of quinine is not justifiable unless preceded by a prophylactic injection of anti-tetanic serum.

Intravenous injection :

Dissolve 10 grs. in 20 c.c. of saline or freshly distilled water. Repeat in eight or ten hours if necessary.

Result, slight discomfort. Direct therapeutic results, prompt, constant and entirely satisfactory. (Wright.)

Technique of intravenous injection of quinine :

If the pulse is bad give a preliminary injection of ether. Inject not less than 1 gramme (15 grains). Sterilize the skin over the median basilic vein. Constrict the upper arm. Enter the needle into the median basilic vein. Loosen the constricting bandage of the arm. Inject the quinine solution slowly.

In serious cases do not delay this injection.

Contra indication. Pregnancy.

QUININE & URÆA HYDROCHLORIDE QUININE CARBAMID DICHLORIDE.

Dose and method of use.—1 gramme (15 grains) injected in a 30 per cent. solution in water, intramuscularly.

The solution is unsuitable for intravenous injection. The injections may be given daily for a week, then weekly for a month and then fortnightly for another month.

Or an injection may be given twice daily for the first three days, giving meanwhile from 10 to 15 grains (0.6 to 1.0 grammes) by the mouth every day for a week, then once a week for a month and finally, once a fortnight for another month.

Following the treatment by either one of the above methods the patient is advised to take quinine, in some form, by the mouth in from 15 to 30 grain doses at least once a month for three months more, to have his blood examined every month at first and on the first symptom of a relapse to seek medical advice.

Technique of injections of quinine and uræa hydrochloride :

Make a freshly prepared solution of 1 gramme, 15 grains in a syringeful of boiling water. (The solution will then be anything from 20 per cent. to 60 per cent. 33.3 per cent. is the optimum strength.) Sterilize instruments. Draw up the solution into a high pressure all glass syringe. Clean the skin with tincture of green soap. Paint skin with iodine or iodine acetone 10 per cent. to 20 per cent.

Inject deeply and empty the needle thoroughly so that when the needle is withdrawn no retained solution shall fall upon the punctured skin.

Seal the puncture with collodium.

As an additional precaution the iodized skin may be covered with a thin piece of rubber tissue stretched taut through which the puncture is made.

REFERENCE.—Cohen, Solomon Solon, Amer. Jnl. Trop. Dis. and Prevent. Med., Aug., 1914, Vol. 2, No. 2, pp. 124 to 129.

RUTHERFORD MORRISON'S FORMULA.

See Bismuth Paste.

RINGER-LOCKE'S FLUID.

Is used in the dressing of wounds.

Sodium chloride 0.6 per cent. to 0.9 per cent.

Glucose

SALVARSAN. Erlich-Hata remedy 606.

Di-oxy Diamino.arseno benzine.bi-hydrochloride.

Synonyms. Arsenobenzol, Arsabenzosol, Kharsivan, Billon, Diarsenol, Arsalyt., *q.v.*

Formula : $C_{12}H_{12}N_2O_2As_2HCl + 2H_2O$.

A pale yellow amorphous powder. Has a tendency to become greyish or brownish-yellow on exposure to the air. Strongly acid in aqueous solution. Contains 34 per cent. of arsenic.

Solubility :

1 in 3·3 of water

1 in 2 of alcohol, 90 per cent.

Insoluble in ether and chloroform.

Soluble in excess of sodium hydroxide solution.

Both salvarsan and neosalvarsan possess very distinct bactericidal power in 1 in 6,000 solution. When the solvent is blood or serum, this power is slightly diminished. After an injection the blood fluids are markedly bactericidal for four hours ; especially is this the case one hour after injection. This is not due to the presence of immune bodies but probably to some compound of arsenic in solution ; for this reason, salvarsan or neosalvarsan might be of benefit in septicæmia and in suppurative conditions.

Salvarsan has been given with benefit in the following diseases :

Syphilis, Yaws, Sleeping Sickness, Malaria, Kala Azar, Ulcerating Granuloma, Rat-bite Fever, Recurrent Fever, Leprosy, Amœbic Dysentery and Hepatitis, Bilharzia, Aleppo, Boil, Glanders, Schistosomiasis, Small Pox, Noma, and also in the incipient Paralyses, Tabes and Epilepsy, of Syphilitic origin.

Dose.—

Adults ...	...	...	...	0· 6 grammes
18 to 20 years	...	...	...	0· 5 grammes
16 to 17 years	...	...	...	0· 4 grammes
10 to 15 years	...	...	...	0· 3 grammes
7 to 10 years	...	...	...	0· 2 grammes
5 to 7 years	...	...	...	0·15 grammes
3 to 5 years	...	...	...	0·10 grammes
— 2 years	...	...	...	0·05 grammes

Or 0·75 to 0·01 grammes per kilo. of body weight (Girling) or $\frac{1}{14}$ th grain per lb. The dose should be slightly smaller for females.

The dose of neosalvarsan is one and a half times that of salvarsan.

Methods of administration.—

Intravenous injection. This is the safest and most effective method.

Intramuscular injection. This method is very painful. Most relapses occur in Syphilis after the administration of the drug by this method. Girling adopts it in the case of children, in whom the intravenous method is very difficult.

By the mouth. The following mixture has been given by Bronchard in Yaws :

Salvarsan	...	...	...	...	0.1 gramme
Soda solution	...	...	...	...	1.0 c.c.
Water	...	...	...	...	100 c.c.

To be taken on an empty stomach and no food to be allowed afterwards for two hours.

Intracranial or Intrathecal administration of salvarsanized serum.

Rectal administration. The dose of salvarsan is mixed with Tr. Opii and injected far up the rectum by means of a long tube.

The exhibition of salvarsan in Sleeping Sickness has the following results :

- (1) The parasites disappear from the cervical glands in 45 minutes.
- (2) Parasites disappear from the peripheral blood quickly and completely.
- (3) Relapses occur in from one half to six months.

Salvarsan is dangerous to life in the third stage of the disease, *i.e.*, in those whose condition is poor or who shew nerve symptoms.

As regards permanent sterilization, salvarsan has less value than atoxyl. (Vorwerk.)

Salvarsan is useful in the treatment of Sleeping Sickness complicated by Syphilis or Yaws. (Lurz.)

Salvarsan and mercury have been tried in combined treatment of Sleeping Sickness but the combination does not possess the power it does in Syphilis. (Lurz.)

For anuria following the exhibition of salvarsan, adrenalin may be given. *See* Adrenalin.

Care must be exercised in the exhibition of this drug in Relapsing Fever, especially in the Asiatic form of the disease, for these cases are highly susceptible to the drug.

4 to 5 grains (0.3 grammes) is a sufficient dose to establish a cure.

Contraindications and dangers:

Advanced general nervous disease :

General paralysis of the insane. Locomotor ataxy. (In the early stages of locomotor ataxy it is beneficial).

Marked cardio-vascular changes :

Uncompensated heart disease, Myocarditis, Aneurism, advanced Arterio-sclerosis. Renal disease (anything more than slight albuminuria). Tuberculosis, Cacchexia, Alcoholism, Infancy. (Some do not give it under the age of ten years).

Some cases of Relapsing Fever.

Routine treatment in Syphilis :

Three injections of salvarsan at intervals of three days each. The day after the first injection, inject 1 grain of mercury cream into the buttock. Carry out injections of mercury cream once a week for nine weeks.

Technique of the intravenous injection of salvarsan :

There are two methods. The concentrated. The dilute.

The concentrated method :

Fill a record syringe with a solution of salvarsan in sterile (preferably distilled) water.

Paint the site of the injection with either :

Iodine ...	...	...	...	...	1 part
Chloroform ...	...	...	...	...	15 parts

or

A 2 per cent. solution of iodine in alcohol.

Constrict the upper arm. Push the needle into the skin and vein. Remove the tourniquet. Aspirate (to see if the needle is really in the vein). Inject slowly. Remove the needle. Again paint the puncture site.

The dilute method :

Instruments required : McDonagh's modification of the record syringe. Sharp platinum iridium needles. Three glass vessels, each of one pint capacity. Sterile salt solution made with water freshly distilled. Sterile towel. Tourniquet. Salvarsan. Sodium hydrate solution 4 per cent. Iodine solution.

Raise the temperature of the saline solution to 105°F. Put 2 ounces of the saline solution into glass 1. Add salvarsan, stirring the while. Add another 3 ounces of saline solution. Stir. Add the sodium hydrate solution drop by drop. (A precipitate forms which clears up as more sodium hydrate is added. When the solution is neutral it should be absolutely clear.) Make up the solution to 12 or 14 ounces by the addition of more saline solution. Spread a towel over glass 2. Filter the solution in glass 1 through the towel into glass 2. Fill glass 3 with saline solution.

Everything is now ready. Let the patient lie on the edge of the bed with the arm hanging towards the floor. Apply the tourniquet to the upper arm. Paint the skin over the site of the inoculation with iodine. Fill the syringe with saline solution and put the tube into the saline in glass 3. Push the needle into the constricted vein.

Loosen the tourniquet. (If the needle is in the vein, blood runs into the syringe.) Inject some saline in order to see that there is no leakage into the tissues. (If salvarsan solution leaks into the tissues it will cause pain and the tissues will slough.) Now transfer the tube, connected with the syringe, from glass 3 into glass 2. Inject slowly, allowing about 20 minutes in order to complete the injection.

The injection may also be performed by means of two burettes each of 100 c.c. capacity graduated into 10 c.c. and again subdivided into 1 c.c. divisions. These burettes are connected to the tube going to the patient by a Y-piece.

The routine of preparation and after-care of the patient :

The patient should be prepared exactly as for a major operation. He should be admitted to hospital the day before and a routine examination should be made of all his organs and of the urine. Pil. hydrarg. 4 grains should be given in the evening, followed next morning by a dose of *mist. alba.*

He may have a very light breakfast, consisting of tea and bread and butter at 7.30 a.m. The injection will be done in the morning between 10 and 12. The administration of adrenalin just before the injection of salvarsan makes the operation safer ; cyanosis, diarrhœa, and suppression of urine are avoided.

After the injection the patient will be kept at absolute rest in bed ; hot water bottles will be applied if necessary.

If there is any syncope :

Pituitary extract	...	...	...	5 c.c.
or Camphorated oil	...	...	...	10 to 15 minims
or Ether	...	...	...	10 minims

may be injected subcutaneously.

At 4.30 p.m. he may be allowed some tea and bread and butter ; he may be allowed the hospital dinner at 7.30 p.m. He should be kept in bed at least until the following morning, preferably forty-eight hours or, better still, three days.

Subsequent events to the injection of salvarsan :

After the injection of salvarsan there is usually a slight rise of temperature, headache and a feeling of malaise. The temperature may rise to 101°F. or even to 104°F., but this last is rare. Vomiting and diarrhœa may occur. These symptoms last from four to eight hours.

Rigors are common. There may also be a feeling of "tightness" in the chest or of "pins and needles" in the fingers.

Anuria, with a highly coloured urine giving a trace of albumen, may follow the injection, but it must be remembered that 20 per cent. of all syphilitics have albuminuria. This anuria may be followed by polyuria. The anuria is due to the irritation of the renal excretory epithelial cells by salvarsan and the consequent diminution of their function.

There may be a temporary Amaurosis after the injection of salvarsan, or optic atrophy may follow the development of optic neuritis.

Technique of Intramuscular Injection :

The injection should be performed in the operating theatre, under strict aseptic technique.

Apparatus : All glass pestle and mortar. Sterilize by putting it into cold water and raising it to the boiling point. Glass record syringe. Freshly prepared distilled water. Solution of caustic soda 15 per cent. Pure carbolic acid. Collodium flexile.

Preparation of the solution. The solution is not prepared until the patient is ready, lying on the operating table. The solution must be injected as soon as it is prepared.

Method of injection. Nick the ampoule with the file. Break the ampoule over the dry sterile glass mortar. Add ten drops of the 15 per cent. sodium hydrate solution. Grind up the mixture with the pestle. Add 8 c.c. of freshly distilled water. Mix thoroughly. Add 15 per cent sodium hydrate solution drop by drop, stirring meanwhile until the solution clears. Add a little sodium hydrate solution in excess. (Twenty drops is the amount usually necessary). Inject at once.

Preparation of the patient. Make out and avoid the lines of the gluteal and sciatic arteries. Choose the upper and outer part of the buttock.

Dab the spot chosen with pure carbolic acid. When the spot turns white, puncture the skin. Inject the solution slowly. Seal with gauze and collodium.

Important points. Asepsis, therefore do the operation in the operating theatre. Use pure carbolic acid and not tincture of iodine. There is no harm in using an excess of the soda solution. Do not injure the sciatic nerve nor artery, nor the gluteal artery. Keep the patient in bed for two days ; let him go home on the third day.

Reactionary effects. There is a re-actionary temperature in eight hours to 100° F. The temperature returns to normal in twenty-four hours.

There is a hard painful infiltration at the site of the injection in 20 per cent. of the cases. This usually subsides under treatment by fomentations.

There is pain at the site of the injection which usually lasts about two hours.

Dose.

Adults	...	...	...	...	6 grammes
From 4 to 14 years			...	...	4 grammes
Under the age of 4 years	...		...	...	2 grammes or less

REFERENCE.—Macdonald, W. M., *Jl. Trop. Med. and Hyg.*, Vol. 19, p. 68.

Technique of subdural or intracranial injection. Monrad-Krohn's method.

Give the patient a hypodermic injection of morphia $\frac{1}{4}$ grain at a point about 10 c.m. above the left zygomatic arch and just behind the border of the hair, anæsthetise the skin by the injection of 5 c.c. of a 1 per cent. solution of novocaine.

Cut a flap of skin. Open the skull with a trephine. Puncture the dura mater obliquely with a fine hollow needle, until the cerebro-spinal fluid escapes. Inject 30 c.c. of the serum. Raise the patient to a sitting posture in order to prevent leaking. Stitch up the skin leaving the trephine hole in the bone open for subsequent injections.

Subsequent injections. Push the needle steadily and slowly through the skin and dura mater until cerebro-spinal fluid escapes. Inject.

Lancet, July 4, 1914, p. 61.

Contraindications :

Diseases of liver, kidneys or intestines, severe circulatory disturbances, *e.g.*, uncompensated heart cases, Myocarditis, Aneurysm, advanced arterio Sclerosis, advanced Tuberculosis, Cacchexia, Alcoholism.

Fatalities :

- (1) Sudden death after the injection.
- (2) Symptoms coming on a day or two after the injection. Severe headache, general weakness, vomiting, diarrhoea, incontinence of the sphincters, dispnoea, cyanosis, convulsions, coma, death in three or four hours.

Post mortem examination shows serious meningitis and punctate hæmorrhages in the brain.

- (3) Suppression (total or partial) of urine, hæmaturia, convulsions, death.

Post mortem examination shows severe degeneration of liver and kidneys as in arsenical poisoning.

These accidents can be averted if an injection of adrenalin is given before the injection of salvarsan, and the diarrhœa and suppression can be cured by the repeated exhibition of the drug.

SALVARSANIZED SERUM.

This is prepared in the following way :—

Give an ordinary injection of salvarsan. One hour afterwards withdraw 40 c.c. of blood from the patient (this will give 12 c.c. of serum). Heat the serum to 50°C. for half an hour. Dilute to 30 c.c. with normal saline.

Method of use.—Intrathecal injection. Intracranial injection. Injection into the lateral ventricle.

CUPRIC SALVARSAN.

This drug is given by intravenous injection dissolved in distilled water containing 5 per cent. of cane sugar. In Sleeping Sickness it has produced blood sterilization of long duration, perhaps even a cure. (Van den Branden, 1914.)

Dose.—0·005 to 0·025 grammes per kilo. body weight.

THE SODIUM SALT OF CUPRIC SALVARSAN has been used with good results in the treatment of Sleeping Sickness, Yaws and Syphilis.

Dissolved in water or syrup it gives a fluid of slightly alkaline re-action which may be injected.

The best solvent is distilled water containing 5 per cent. sugar.

Dose.—0·1 to 0·6 grammes. Massive doses 0·7 gramme per kilo. body weight have given good results in Sleeping Sickness.

SANITAS.

An oxidising agent. Acts more slowly than peroxide of hydrogen.

SCOPOLAMINE.

Dose.— $\frac{1}{100}$ th grain.

Method of use.—Hypodermic injection.

SODIUM BICARBONATE.

Is used in the treatment of Cholera.

Dose.—2 litres of a $\frac{1}{2}$ per cent. solution in saline.

Method of use.—Intravenous injection.

These injections are repeated until the urine becomes alkaline or polyuria appears.

Hypodermic injection 100 c.c. of 2 per cent. solution in Acute yellow atrophy of the liver.

Sodium bicarbonate has also been used in the following way in the treatment of Kala Azar and Cholera :

If the specific gravity of the blood is low, a 2 per cent. to 3 per cent. solution is injected subcutaneously or per rectum.

If the specific gravity of the blood is high or almost normal, the same solution is given intravenously for the first time and subsequently by rectal injection.

For the œdema of liver and brain in alcoholism, and the subsequent fatty degeneration, the following formula is useful :

R

Sodium bromide	...	...	...	10·2 grammes
Sodium chloride	...	...	...	5·8 grammes
Sodium bicarbonate	...	...	...	8·4 grammes
Sterile tap water	...	...	...	1,000 c.c.

The solution is prepared in the following way :

Boil the sodium chloride and the sodium bromide in 100 c.c. of water. Filter. Reboil. Boil the sodium bicarbonate in 30 c.c. of distilled water. Filter. Reboil. Mix the two solutions with 850 c.c. of water just before use.

Method of use.—Intravenous injection.

SODIUM CACODYLATE.

This has been given in Pellagra alternately with injections of iron arsenite, and it has also been given in cases of Tropical Buboe.

Dose.—3 to 5 grains.

Methods of use.—Intramuscular injection. Subcutaneous injection.

Routine of treatment :

3 grains may be given every third day until three doses have been given. Then every second day until three more doses have been given. Then 5 grains every second day until symptoms have improved.

During these injections give liquor arsenicalis by the mouth and until three months after all symptoms have disappeared.

SODIUM CARBONATE.

For the "Alkaline fluid" of Rogers, *see* under "Sodium chloride."

SODIUM PERBORATE.

A saturated solution in water contains about $2\frac{1}{2}$ per cent. of the drug.

The salt in powder is very stable. The solution is alkaline and is very unstable. The solution is easily prepared by adding an excess of the salt to water and using the residue as an index of saturation.

SODIUM CHLORIDE.

Isotonic or normal saline.

Equivalent concentration to that in the blood serum namely 0.6 per cent.

Hypertonic—"Wrights' solution."

Sodium chloride	...	...	...	...	5 parts
Sodium citrate	...	...	...	...	$\frac{1}{2}$ part
Water	...	...	...	...	100 parts

This may be combined with carbolic acid 1 in 60. The sodium citrate may be left out. (Sea water=2.5 per cent. solution.)

STOCK SOLUTION for the making up of Wright's saline solutions.

It will be found most convenient to keep a saturated solution as a stock solution. The strength of this is about 35 per cent. An excess of salt is placed in the water and is allowed to settle.

The following dilutions are easily made :

Stock solution 1 part, with water 6 parts, gives a 5 per cent. solution.

Stock solution 2 parts, with water 5 parts, gives a 10 per cent. solution.

Stock solution 1 part, with water 39 parts, gives a 0.85 per cent. solution.

These solutions should always be used hot.

The properties of the various saline solutions :

HYPERTONIC 8 PER CENT.	5 PER CENT.	ISOTONIC 0.85 PER CENT.
Lymphagogue	Lymphagogue	—
Destroys leucocytes setting free Trypsin	Destroys leucocytes setting free Trypsin	—
Inhibits emigration	Inhibits emigration	Produces a positive chemo- taxis
Prevents phagocytosis	Prevents phagocytosis	Does not inhibit phago- cytosis
Prevents the coagula- tion of lymph	Inhibits coagulation and thus prevents the sealing up of orifices through which the lymph pours into the wound	Does not inhibit coagula- tion.
Inhibits bacterial growth	Inhibits bacterial growth	Does not inhibit bacte- rial growth.
Suspends the action of the Tryptic ferment	—	Does not interfere with the action of the Tryp- tic ferment.
Produces hyperæmia	Produces less hyper- æmia	—

It will be seen that saline solutions vary in their action according to their strength. As regards a wound, their action may be either beneficial or harmful; moreover, an action that is of benefit at one time may be harmful at another, according to the state and progress of the wound.

Wright's method of treatment of wound infections by saline solutions consists, essentially, in varying the strength of the solutions used in order to meet the varying conditions of the wound.

The effects of the exhibition of saline solutions on a wound may best be considered as to whether they are beneficial or harmful at the particular stage that the wound has reached in re-action or towards repair.

Prevention of bacterial growth :

Beneficial. Entirely beneficial.

Harmful.

Promotion of bacterial growth :

Beneficial.

Harmful. Entirely harmful, but it may be necessary to allow it to go on for a time, in order to reap the benefits of tryptic digestion.

Lymphagogenic action :

Beneficial. It draws out from the tissues lymph that has lost its bacterial energy. It draws into the tissues from the blood stream lymph which is inimical to the growth of the saprophytic bacteria and which seriously impedes the growth of saprophytic bacteria and above all of the *Streptococcus*. The result is that the microbes that have invaded the tissues are now no longer safe.

Harmful. The saline solution causes oedema of the tissues.

Emigration of leucocytes :

Beneficial. Ingestion of the bacteria by the leucocytes.

Harmful. By the destruction of leucocytes, trypsin is set free. Bacteria flourish in the presence of trypsin and it exerts a digestive action in the wound.

The formation of pus is thus encouraged with the consequent absorption of toxins.

Prevention of emigration :

Beneficial. Allows the digestive action of trypsin to come into play unchecked.

Harmful. Allows bacteria to accumulate in the wound.

Destruction of leucocytes :

Beneficial. The setting free of trypsin with the consequent "cleansing digestion" of sloughs.

Harmful. The digestion of wound surfaces.

Tryptic ferment :

Beneficial. For the digestion of sloughs.

Harmful. When the wound becomes "lymph bound." When the wound is left too long undressed it allows of the unrestricted multiplication of sero-saprophytic bacteria. Bacterial poisons may be absorbed. Tissues of repair are damaged.

Hyperæmia :

Beneficial. When "lymph lavage" is required and is in progress.

Harmful. When repair is required.

Coagulation of lymph :

Beneficial.

Harmful. It reduces the activity of lymph in the walls of the wound. Prevents "lymph lavage." Allows an extension of the infiltration of the tissues.

The following examples of the application of Wright's methods will serve to shew the lines on which it is used.

- (1) The problem. A lymph bound, sloughing, infiltrated and infected wound.

Indications. To get rid of the coating of scab and fibrin adhering to the surfaces of the wound. To set the lymph flow going. To resolve the infiltration. To promote the separation of sloughs.

Compliance. Use hypertonic solution in restricted quantity, so that later it becomes isotonic by dilution with lymph.

Note.—The salt first diffuses into the tissues and sloughs. When the dilution in the wound by the lymph poured out is accomplished, the salt diffuses out of the tissues after having there destroyed leucocytes, thus setting free trypsin ferment which now digests the sloughs. Leucocytes now emigrate into the wound and are there destroyed, bacteria begin to multiply and pus is formed. It is now necessary to redress the wound.

(2) The problem. Threat of hæmorrhage.

Indication. The prevention of tryptic digestion.

Compliance. Keep the hypertonic solution at full strength.

(3) The problem. Gas gangrene, strptococcic cellulitis, some other acute tissue infection or the infection of a joint.

Indications. (a) To draw out as rapidly and exhaustively as possible the corrupted lymph.

(b) To replace this by uncorrupted lymph.

Compliance. Incise freely or open the joint. Apply and keep the hypertonic solution at full strength until we have the upper hand of the infection.

Hypertonic saline intravenous injections have been given in Cholera.

Dose.— $8\frac{1}{2}$ pints injected at the rate of 2 ounces per minute.

Method of use.—Intravenous injection.

Transfusion rigors are controlled by the use of hot water bottles and the hypodermic injection of morphia and belladonna $\frac{1}{4}$ grain of each.

ROGER'S FORMULA.

Sodium chloride	...	...	...	...	120 grains
Calcium chloride	...	...	...	...	4 grains
Potassium chloride	...	...	...	...	6 grains
Sterile water	...	...	...	...	1 pint

The sodium chloride can be used alone in an emergency.

It is convenient to have the following solution ready prepared, and to add it to each pint of saline solution immediately before use.

Calcium chloride	...	...	...	...	4 grains
Potassium chloride	...	...	...	...	6 grains
Water ...	...	...	...	...	1 drachm

ROGERS' ALKALINE FLUID.

For intravenous injection in Cholera :

Sodium carbonate	...	...	...	...	160 grains
Sodium chloride	...	...	...	...	60 grains
Water ...	...	...	...	...	1 pint

The sodium carbonate must be sterilized in the solid state in order to avoid chemical alteration.

Continuous intravenous injection. Cox's method.

This treatment has been used in the treatment of Dysentery with the following objects in view :

- (1) The dilution of the blood.
- (2) The raising of the blood pressure.
- (3) The re-establishment of the renal function.
- (4) The elimination of endotoxins from the blood and stools.

Method. From 8 to 10 pints of hypertonic saline solution are allowed to flow into the vein at the rate of 2 ounces a minute.

After 8 pints have been injected a change is made to isotonic solution.

The infusion usually lasts one and a half hours.

A re-action rigor commences after 5 pints have been given. The re-action is a good sign and the continuation of the infusion after the rigor will end the pyrexia.

The following rules should be observed.

(1) If pyrexia of 103°F . is associated with the infusion of less than 6 pints, lower the temperature of the infusion and continue its administration.

(2) When the stools are bloody, infuse at 98°F . and only give 5 or 6 pints.

(3) In profound collapse, infuse at the rate of 4 ounces a minute with two apparatus, if necessary, until the blood pressure returns, when continue at 2 ounces a minute.

(4) After the rigor, give hypodermically, atropine $\frac{1}{100}$ th grain and morphine $\frac{1}{40}$ th grain.

(5) A cistern temperature of 107° to 108°F . delivers at about 99° or 100°F .

Normal saline solution is also used in the treatment of Malaria and Blackwater Fever when, owing to vomiting, fluids are not retained.

SODIUM GYNOCARDATE. A sodium soap of Gynocardic acid B and C.

Has been used in the treatment of Leprosy with highly promising results. (Rogers, 1916.)

Dose.—This has not yet been determined. $\frac{1}{10}$ th to $\frac{1}{5}$ th grain.

Method of use. Subcutaneous injection (painful, slow improvement). Intravenous injection (painless, rapid improvement in Leprosy).

Prepare a 2 to 3 per cent. solution in distilled water or normal saline solution. Sterilize in an autoclave. Add sufficient acid carbolic to make 2 per cent. solution.

If after this the solution is not quite clear, filter and sterilize again.

After effects. After the injection of from $\frac{2}{5}$ th to $\frac{3}{5}$ th grain there is a local re-action of affected parts, accompanied by the breaking down of tissue and fever. This is followed by improvement.

SODIUM IODIDE.

This drug has been given with "markedly good results" by Da Matta in cases of Tropical Buboe.

Dose.—5 to 20 grammes is given gradually increasing doses daily thus:

5, 10, 15, 15 grammes
or 5, 10, 15, 20 grammes
or 5, 10, 10, 20 grammes
or 10, 15, 20 grammes

Method of use. Intravenous injection.

TETANUS ANTITOXIN.

1 German unit is equal to 400 U. S. A. units.

10 c.c. of Pasteur Institute serum is equal to 600 U. S. A. units.

That is to say:

15 German units = 600 U. S. A. units = 10 c.c. Pasteur Institute serum.

Prophylactic use:

"The experience gained during the first year of the war has confirmed the opinion that from 500 to 1,000 U. S. A. units of tetanus antitoxin is a sufficiently large prophylactic dose for the

majority of cases and that it is advisable in severe wounds to repeat the dose once or twice at intervals of a week Those cases of tetanus which develop some weeks after the receipt of an injury may be due to the re-activation of a quiescent focus by too early or too energetic passive movement."

Maconkey, B. M. J., Dec. 11, 1915.

Another method :

Dose.—1,000 to 1,500 U. S. A. units given subcutaneously. Repeat the dose in ten days.

It is important to give the drug prophylactically before undertaking an operation on a case that has been exposed to infection by a dose of 1,500 units injected subcutaneously, intramuscularly and into the nerve sheathes around the affected part.

Therapeutic use :

Dose.—At least 3,000 units must be given intrathecally. At the same time 10,000 to 20,000 units should be given either subcutaneously or intramuscularly, astride the paths of the toxin to the spinal cord by multiple injections. (Leishmann and Smallman, 1916.)

These doses should be repeated as frequently as the course of the case should seem to demand. May be used prophylactically in the treatment of Rabies but the effect is transient, lasting only three weeks.

Weintraube and Unger's method :

Open either the radial or ulna artery. Pass a uræteral catheter, vaselined, until its point is in the arch of the aorta. Inject the antitoxin into the blood stream.

Hedden's method :

Inject the antitoxin into the internal carotid artery.

The object of these two methods is to secure concentration of the antitoxin in the blood vessels of the brain and spinal cord.

The former is the better method as the branches of the thoracic and abdominal aorta carry the fluid into the spinal cord. The drug may be given by the following methods, given in their

order of merit : Intramuscular injection, Subcutaneous injection, Intrathecal injection, Intravenous injection.

The two last methods should probably be given up.

Technique of intrathecal injection :

The operation may be performed anywhere between the lower border of the spinous process of the second lumbar vertebra and the termination of the theca just below the line drawn transversely between the two posterior superior iliac spines.

Anæsthetize site of puncture. Place the patient sitting at the edge of the table with his head and body bent well forward. Enter the needle just below one of the spinous processes, between the second lumbar and first sacral, inclusive. Push upwards and forwards. At a distance of from 2 to 2½ inches in adults and from about 1 inch in children the spinal canal will be entered. Allow the cerebro-spinal fluid to flow out drop by drop. Up to 30 c.c. may be allowed to flow out in adults and up to 10 c.c. in children. As far as possible, the quantity of fluid to be injected should be the same as that removed. The injection should be performed slowly either by a syringe or a gravity apparatus.

Note :

Suction should never be employed. The patient might die instantaneously from pressure of fluid on the fourth ventricle. After the injection the patient should have complete rest in bed for at least twenty-four hours. After the injection of serum, the head and shoulders should be lowered so that the fluid may gravitate to the brain. (After the injection of an anæsthetic, the head and shoulders are raised for the opposite reason.) In children and in cases of tetanus, a general anæsthetic is necessary.

THIOSINAMIN. (Allyl-thio-carbamide.)

Has been found useful for softening and removing scar tissue, *e.g.*, fibrous stricture of the œsophagus, tinnitus due to cicatricial adhesions in the middle ear, uterine fibromata, burns, chronic arthritis and arthritis deformans.

Dose and method of use :

R

Thiosinamin	...	...	...	...	...	8 parts
Glycerine	...	...	...	...	...	20 parts
Water	...	...	...	...	...	72 parts

Inject 20 minims subcutaneously.

R

In 15 per cent. to 20 per cent. alcoholic solution.

R

Five per cent. watery solution.

Dose.—Five to thirty-five minims injected subcutaneously twice a week beginning with the smaller dose.

The treatment should be persevered in for weeks or even months.

THYMOL.

Has been used in Ankylostomiasis and in Amœbiasis.

Dose.—15 to 45 grains (1 to 3 grammes.)

TRI-SODIUM CITRATE.

This drug has been injected in Pellagra by Secchieri, on the assumption of Alessandrini and Scala's theory, which is that Pelagra is due to an acid intoxication, caused by the drinking of water containing colloidal silica, from which certain electrolytes are absent.

TYPHOID VACCINE.

Method of preparation.—Virulent cultures of typhoid bacilli are grown in broth for forty-eight hours. They are then killed by heat and a little lysol is added.

Dose and method of use.—First inject 500,000,000. Allow an interval of from seven to ten days. Second injection of 100,000,000.

Results.—Case incidence, reduced by four-fifths Case mortality, reduced by one-half.

UNGER'S METHOD.

See Tetanus Antitoxin.

UNNA'S PASTE.

Gelatine	...	...	...	...	5 parts
Zinc oxide	...	...	...	...	5 parts
Boric acid	...	...	...	...	1 part
Glycerine	...	...	...	...	8 parts
Water with 5 per cent. lysol	...	...	...	...	6 parts

UREA.

Has been given to stimulate renal activity in the treatment of Yellow Fever.

Dose.—15 grains.

Method of use.—Subcutaneous injection. Rectal injection.

UROTROPIN. (Hexamine.)

Is used as a urinary antiseptic. When given by the mouth it is excreted in the urine as formaldehyde *provided the urine is acid*. (Sodium acid phosphate may be given.) It has been given in the Bacilluria of Typhoid Fever. It is the best drug of all in Phosphaturia.

In the Bacilluria of *B. Coli* infections it never fails if combined with sodium benzoate.

It is excreted in the cerebro-spinal fluid and is of value in Acute anterior poliomyelitis, in Cerebro-spinal meningitis, as an accessory in the treatment of General paralysis of the insane, in gun-shot wounds of the head and as a prophylactic before operations on the brain. It is also given with benefit in Pellagra.

It is given with benefit in septic inflammations of the conjunctiva and cornea. It is also excreted by the liver cells and by the gall bladder.

Dose.—5 to 15 grains (0.32 to 1.0 grammes.)

VIOFORM. Idochloroxychinoline, Idochloroxyquinoline.

Has been used to stimulate granulations in Phagedæna.

In operations on tubercular joints, it is most conveniently used as an emulsion.

Vioform	...	...	...	...	...	50 parts
Glycerine	...	...	...	...	...	200 parts
Sterilized water	...	...	...	...	...	200 parts
Alcohol	...	...	...	...	...	100 parts

WEINTRANDE AND UNGER'S METHOD.

See Tetanus Antitoxin.

WRIGHT'S STYPTIC SOLUTION.

Extract of thymus or testis made with saline solution. Add 5 per cent. calcium chloride. Add a trace of sodium carbonate. Add carbolic to make up to 1 per cent.

YERSIN'S SERUM.

Is used in the treatment of plague.

The routine treatment of Plague by Yersin's serum :

The total volume administered should be from 200 to 400 c.c. Intravenous administration gives far the best results, but subcutaneous injection is more easy; usually it is convenient to combine both methods in the treatment of each case.

Dose.—60 to 300 c.c. Intravenously and subcutaneously in the neighbourhood of the buboes.

Penna's method for use in severe cases :

Give 100 c.c. intravenously at once. Give from 60 to 100 c.c. intravenously every day. Do not stop the administration of the serum immediately the fever has subsided, but continue it in gradually diminishing doses. During the administration of the serum give calcium chloride by the mouth.

Results.—Case mortality 22.2 per cent.

ZINC CHLORIDE.

A solution of 40 grains in an ounce of water is useful for washing out wounds, after operation, communicating with septic cavities such as the mouth and rectum.

ADDITIONAL FORMULÆ.**ANTIMONY OXIDE.**

The following formula has been used by Castellani :—

Antimony oxide	...	...	...	...	$\frac{1}{50}$ grain
Glycerine	...	...	...	...	15 minims
Aq. Dest.	...	...	...	...	15 minims

Method of use.—Intramuscular injection.

ANTIMONY TARTRATE.

Has been given with benefit in the treatment of espundia, grannuloma inguinale, oriental sore, yaws, relapsing fever, and kala azar.

The following formula have been given by intramuscular injection :

R

Antimony tartrate	...	...	...	...	8 grains
Acid carbolic	...	...	...	...	10 grains
Glycerine	...	...	...	...	3 drachms
Sodium bicarbonate	...	...	...	...	$\frac{1}{3}$ grain
Distilled water	...	...	...	...	1 ounce

The Sodium bicarbonate may be omitted.

Dose.— $\frac{1}{2}$ to 1 c.c.

The following solutions may be given intravenously :—

R

A 1 per cent. solution in normal saline.

Dose.—4 to 7.5 c.c. Given on alternate days. (Mackie.)

R

Antimony tartrate	...	...	...	4 grammes
Carbolic acid solution 2 per cent.			...	100 c.c.

Dose.— $\frac{1}{2}$ to 2 c.c. well diluted with enough saline to make 5 c.c.

An ointment containing 2 per cent. of the drug has been used by Low in the treatment of oriental sore.

CASTELLANI'S YAWS MIXTURE (modified).

The following mixture is a more elegant preparation than that given on page 21 :

R

Antimony tartrate	...	...	...	1 grain
Sodium bicarbonate	...	...	...	15 grains
Sodium salicylate	...	...	...	10 grains
Potassium iodide	...	...	...	1 drachm
Glycerine	...	...	...	2 drachms
Water	...	...	...	1 ounce

For the Glycerine may be substituted, either syrup 1 drachm, or sodium tartrate 10 grains.

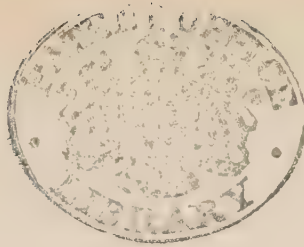
QUININE URETHANE.

The following formula has been given in Malaria coma with good results by Richet and Griffin:

Chlorhydrate of quinine	...	...	...	0.40 c.c.
Urethane	...	...	...	0.20 c.c.
Distilled water	...	...	...	1.0 c.c.
Physiological serum (warm)		...	...	14.0 c.c.

Dose.—The above formula is one dose for an adult.

Method of use.—Intravenous injection :



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Acid picric, 12

Acid salicylic, 16

Acid salicylic gelatin, 17

Alcohol, 18

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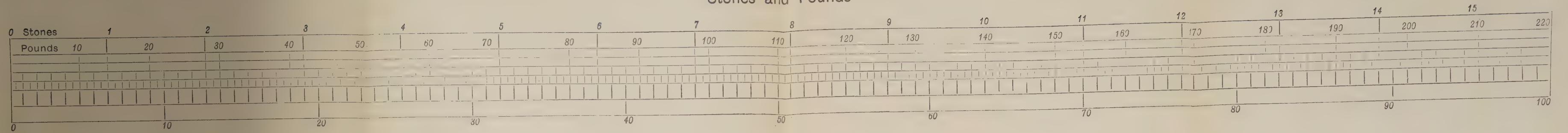
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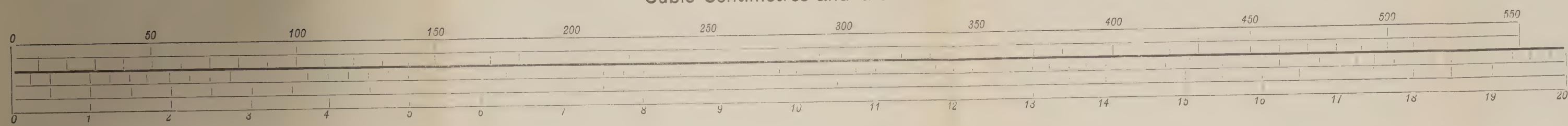


Stones and Pounds



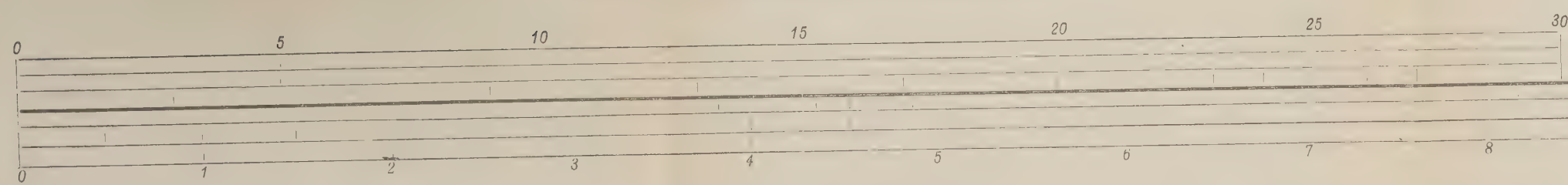
Kilogrammes

Cubic Centimetres and Grammes



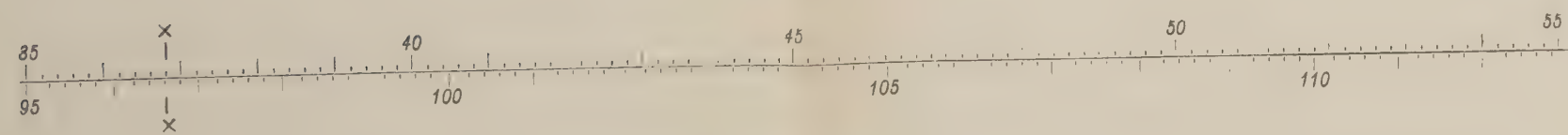
Ounces Solid and Fluid

Cubic Centimetres and Grammes

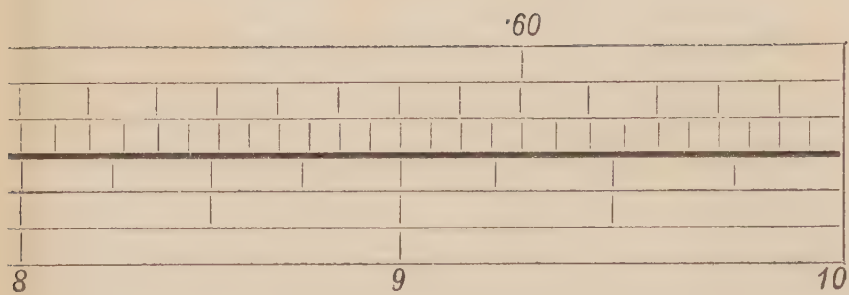
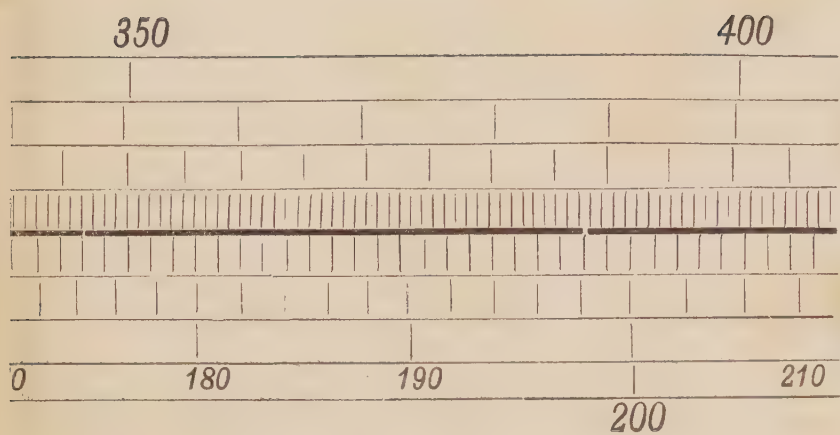


Drachms Fluid and Solid

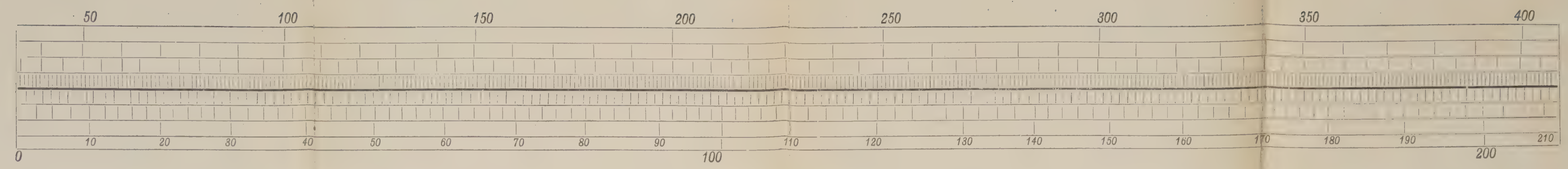
Centigrade



Farenheit

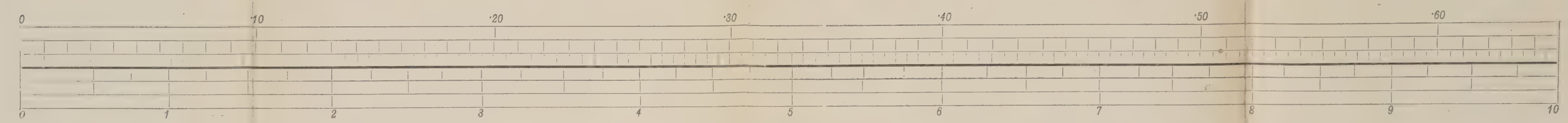


FARENHEIT



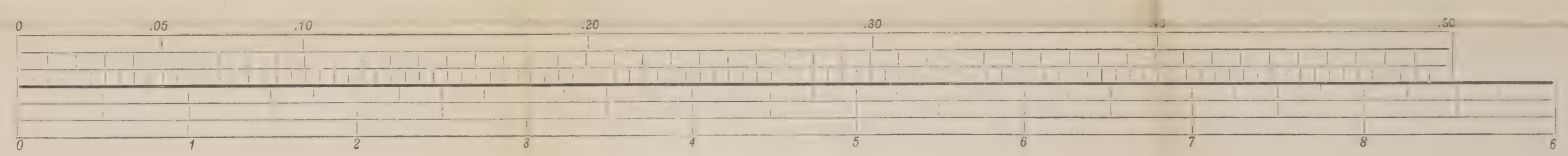
CENTIGRADE

GRAMMES



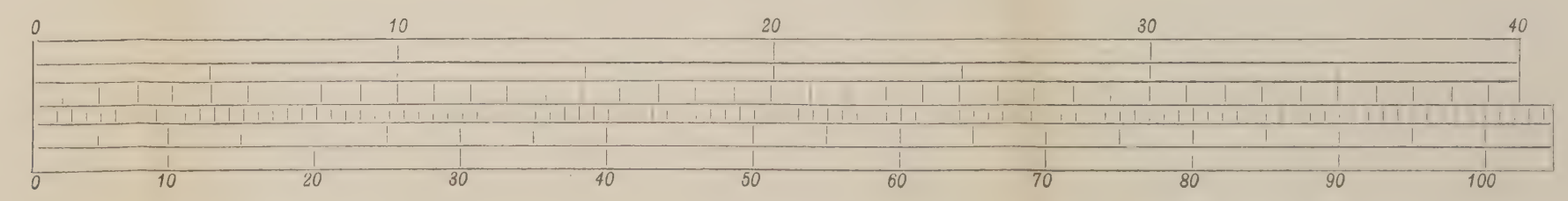
GRAINS

Cubic Centimetres



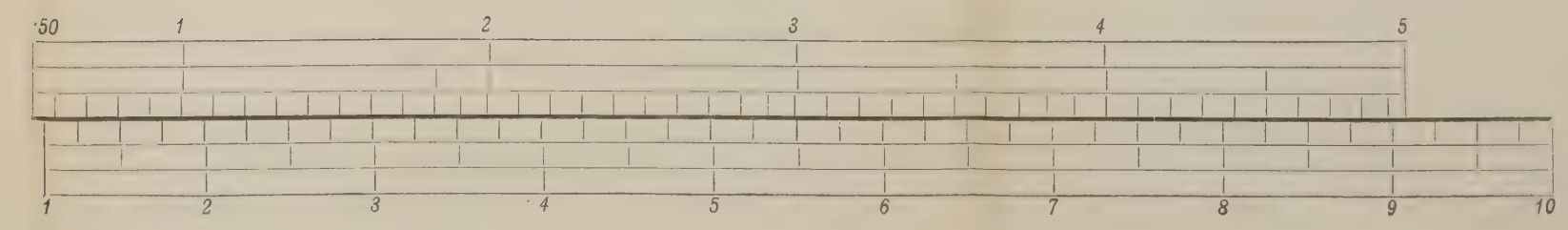
Minims

Thousandths of an Inch



Microns

Grains to the Drachm



Percentages



